RAILROAD GAZETTE

FRIDAY, MAY 31, 1901.

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Contributions

A Plea for the Despatcher.

TO THE EDITOR OF THE RAILROAD GAZETTE.

A recently published report to the Pacific Coast Railway Club [*Railroad Gazette*, Nov. 23 and 30 and Jan. 25] relates some instances of defective train despatching, to which the writer, as a despatcher, and believing that he speaks for the great body of despatchers of America, ventures to make reply.

The author of the report cites a case in which two freight trains meet at a certain station where there is but one side-track, and that only long enough to hold one train. One of the freights holds an order that a passenger train, soon to be due, is running 40 minutes late, but the other has not this order. As a consequence, the train having the order is blocked and prevented from going to the next station. They "saw" the passenger train, the latter being delayed 18 minutes, and the freight trains 45 minutes. The author says that "this could have been avoided by giving the freight going west orders at the last telegraph station they passed, where they stopped to pick up a car." We are not informed as to whether it was possible to give the order; whether the despatcher knew that he could put out 40 minutes, or any time, on the passenger train at that time; whether the operator at said station or the one at the meeting point could be "raised"; whether the despatcher knew the freight train was to pick up a car; whether he was sitting in his chair doing nothing or was busy fixing meeting points between passenger trains or getting out schedules for stock or other trains more important than the two freights in question; whether he had reason to suppose that the passenger train would be delayed 18 minutes if it did come to the worst, or whether a *reasonable* delay for a "saw-by" would be all that might be expected. Until we know the facts in the case we prefer to reserve our opinion as to the negligence of the despatcher. He further adds that the time was made up by the passenger train, which extraordinary speed caused a pin on the engine to heat, and five minutes were lost in cooling same, which was turned in by the despatcher as engine failure. On the same hypothesis, if the engineer had run so fast as to jump the track, ditch his train and kill all on board, the despatcher would have been responsible for that.

Another instance cited is where a passenger train meets two sections of an opposing passenger train at a station which is not a regular stop, the order being put out at the meeting point for the two sections, which were the superior trains; the inferior train being clear of the main track before the arrival of the others, yet both were stopped to sign the order. We admit this does have the appearance of bad management, yet we are not ready to agree that it was "owing to the carelessness of the despatcher" in not putting out the order where they made their last stop, until we are a little more acquainted with the conditions. Was their "last stop" five miles or 50 miles away? Did he know at that time that this would be a meeting point? Was there any unexpected delay between the *last report* before the "last stop" and the leaving time at said "last stop"? (Anyone who does not grasp the idea, ask some despatcher to explain it to him.) Were the wires in perfect working order? Were the operators all at the keys at a moment's notice? We should infer, from the description, that he intended to take up the order to the superior trains after the inferior train arrived, but any one of a half dozen circumstances might prevent. The inferior train may have cleared considerably sooner than he expected. Despatchers know that this sometimes happens. The fact is probably not so apparent to train men.

"A limited train arrives at a division terminal 15 minutes late and is ready to leave in five minutes, but is given orders to run 30 minutes late." All we can say for this is that no despatcher who expected a limited train to arrive 15 minutes late would send an order for it to run 30 minutes late. He must have been misinformed as to its arrival, and the charge of poor judgment is absurd on the face of it.

In offering this reply, we do not mean to indicate any resentment of just criticism or to repel any suggestion which may in any way increase the efficiency of despatchers or improve the service. If trainmen and despatchers would discuss their grievances with each other, many a wrinkle might be smoothed out and much lack of harmony overcome. The grievances are not all on the side of the trainmen. Despatchers have them. If trainmen and others would occasionally volunteer a little information with regard to certain situations perhaps the despatcher could make better meeting points. He is 25, 50 or 100 miles from the scene of action. They are on the ground. There are things that he does not know until he is told, and when he knows them they have a material bearing on the case in hand.

A man who is not a despatcher is not always capable of criticising the work of a despatcher. He may be "intimately associated" for a lifetime, but if he sat down to a train sheet on a heavy division it would be a revelation to him. We do not intimate that all train despatching is faultless. In many cases it can be improved. But before deciding that the despatcher is the source of the difficulty, let us suggest that inquiry be made into the facts. Investigation may prove that it was due to circumstances which could not have been foreseen or avoided.

H. A. DALBY.

The Railroads of the World.

The following table is compiled and reduced from those published in the *Archiv für Eisenbahnwesen* for May-June, of this year. The miles are to the end of 1899. The figures given in the *Archiv* of kilometers of railroad per 100 km² and 10,000 inhabitants have been reduced so as to show the number of square miles of territory and the number of inhabitants per mile of railroad, which will have an immediate significance at sight. These statistics are discussed on the editorial pages.

Railroads of the World at the End of 1899.

Country.	Miles, 1899.	P. c. increase 1895 to 1899.	Per mile of railroad. Inhabitants.	Square miles.
EUROPE:				
German Empire	31,392	8.8	1,661	6.68
Austria-Hungary (including Bosnia and Herzogovina)	22,545	17.5	1,964	11.51
Great Britain and Ireland	21,671	2.4	1,951	5.65
France	26,234	4.9	1,477	7.80
Russia (with Finland)	28,589	21.9	3,745	68.97
Italy	9,772	4.4	3,226	11.29
Belgium	3,850	8.9	1,730	2.96
Netherlands (with Luxemberg)	1,982	2.8	2,638	6.24
Switzerland	2,343	7.4	1,300	6.82
Spain	8,254	10.2	2,208	23.80
Portugal	1,476	1.5	3,425	23.80
Denmark	1,765	25.3	1,309	17.30
Norway	1,231	11.3	1,730	103.09
Sweden	6,665	9.9	752	25.91
Servia	359	7.0	6,452	51.81
Roumania	1,920	12.8	3,155	32.68
Greece	604	4.5	4,032	41.32
Turkey in Europe (with Bulgaria and Roumelia)	1,901	35.7	5,025	56.50
Malta, Jersey and Isle of Man	68	...	4,787	62.11
Total Europe	172,621	10.5	2,208	22.17
ASIA:				
British India	22,491	15.5	13,333	88.50
Ceylon	297	...	11,380	88.50
Asia Minor and Syria	1,715	55.9	9,000	625.00
Russia (Trans-Caspia)	1,659	86.2	423	123.46
Siberia	3,747	243.9	1,532	1,250.00
Persia	34	...	166,667	200,000
Dutch India (Java and Sumatra)	1,294	0.3	20,408	208.33
Portuguese India	51	...	12,345	....
Japan	3,635	62.4	10,101	44.44
Malay States (Borneo, Celebes, etc.)	209	140.0	3,425	156.25
China	401	223.0	1,000,000	50,000
Siam	167	86.8	52,630	1,667.00
French India (Cochin China, Pondicherry, Malacca and Tong-King)	238	18.6	....	....
Total Asia	35,938	33.3	28,600	474.00
AFRICA:				
Egypt	2,087	65.7	4,739	208.33
Algiers and Tunis	2,642	28.8	2,404	125.00
Cape Colony	2,937	...	601	103.09
Natal	737	...	1,059	36.50
So. African Republic	1,203	...	722	103.09
Orange Free State	597	...	350	88.50
Mauritius, Reunion, Gold Coast, Lagos, Congo, Angola, German S. W. Africa, Mozambique, German E. Africa, Somali, Erithrea	2,298	...	....	....
Total Africa	12,501	53.0	....	....
AUSTRALASIA:				
New Zealand	2,271	3.5	328	77.00
Victoria	3,142	0.7	375	28.57
New South Wales	2,706	3.5	499	123.45
South Australia	1,882	0.7	193	625.00
Queensland	2,746	15.4	177	312.50
Tasmania	479	1.0	372	56.50
West Australia	1,361	18.4	124	625.00
Hawaiian Islands	88	24.6	124	77.52
Total Australasia	14,675	5.8	311	208.33
NORTH AMERICA:				
United States	189,295	4.1	392	15.92
British North America	17,250	7.9	304	208.83
Newfoundland	593	27.1	317	68.83
Mexico	8,505	15.1	1,490	88.48
Central America (Guatemala, Honduras, Nicaragua and Costa Rica)	647	4.1	3,666	312.50
Total North America	216,290	4.9	437	34.00
SOUTH AMERICA:				
Colombia	346	7.1	13,513	1,666.67
Cuba	1,134	2.6	1,437	41.32
Venezuela	634	...	3,831	625.00
San Domingo	117	63.5	4,367	156.25
Brazil	9,197	22.7	1,984	312.50
Argentina	10,015	14.1	452	103.09
Paraguay	157	...	3,215	625.00
Uruguay	998	...	830	68.97
Chili	2,792	41.9	1,073	103.09
Peru	1,037	...	2,873	625.00
Bolivia	622	...	3,922	625.00
Ecuador	186	...	6,452	625.00
British Guiana	21	...	12,345	5,000.00
Jamaica, Barbadoes, Trinidad, Martinique, Puerto Rico, Salvador	618	32.67	....	....
Total S. Amer. and West Indies	27,874	16.8	1,578	242.00
RECAPITULATION:				
Europe	172,622	10.5	2,208	22.17
Asia	35,938	33.3	28,600	474.00
Africa	12,501	53.0	13,490	921.00
Australasia	14,675	5.8	311	208.33
North America	216,290	4.9	....	....
South America	27,874	16.8	1,578	242.00
The world	479,900	10.2	3,099	109.00

The increase of railroads in the world from 1895 to 1899 was 44,575 miles. The populations in Asia and Africa, in some countries, of course are only estimates, and in many others are based on censuses long past.

The Heat Treatment of Steel.

In all the discussions on the heat treatment of steel the matter has been treated as though it was new, and the writers appear to have forgotten the early work of Chernoff, Metcalf and others, and the later work in the early 90's. It is well to realize thoroughly that this is no new fad. Notwithstanding all that has been said on this subject it has been a hard matter to get engineers to realize that steel can be rendered almost worthless by being finished too hot in rolling. When this important fact is fully appreciated we may expect to get the best results from steel, as means will be taken to give it the proper heat treatment in rolling.

In Mr. Metcalf's classical paper on Steel, presented before the American Society of Civil Engineers March 2, 1887, and reprinted in the *Railroad Gazette* of March 18, he says: "As steel congeals it forms crystals and the sizes are largely affected by the rate of cooling; slow cooling favoring the formation of large crystals, quick cooling and also agitation producing fine crystals. . . In every piece of steel that is in existence to-day there is a sure record of the last temperature to which it was subjected as well as of the manner in which the steel was worked. I mean to say that for every variation of heat that is visible to the naked eye there is a corresponding variation in structure which is equally visible to the naked eye if the record be opened by fracturing the piece. . . . For a double quantity of carbon we have five times the difference in specific gravity, due to an equal difference in temperature. . . . The finest crystals and the best structure can only be formed by quick cooling and the violent agitation of the hammer or of the rolls."

At the World's Fair Congress of Engineers, in Chicago, Mr. Albert Sauveur, then in the employ of the Illinois Steel Co., gave the results of his investigation on the heat treatment of steel rails in six propositions, which are well worth the study of anyone interested in this subject. His paper will be found in the *Transactions* of the Institute of Mining Engineers, Vol. XXII., from which we quote:

"A polished and etched section of steel rail when examined under the microscope does not by any means reveal in all its parts the same structure. This heterogeneousness of structure is due to the different temperatures at which the various parts of the rail leave the finishing-rolls, and to the unequal rate of their subsequent cooling. The propositions formulated in the first part of this paper should enable us to foretell such variations in the structure of a rail.

"The outside of a rail, leaving the rolls coldest and cooling quickest, will offer less chance for crystallization, and should therefore show a smaller grain than the inside, which, being the hottest and cooling down more slowly, will favor the crystallization of the metal, the size of the crystals or grains reaching its maximum in the center of the head. It might also be inferred that the smallest grain will be found at the extremities of the flange, since this is always the coldest-finished region. Proceeding from the outside to the inside we shall find the tendency toward coarse crystallization gradually increasing.

"The same propositions tell us, moreover, that for a given chemical composition the higher the finishing temperature of the rail and the slower the cooling the more pronounced will be the crystallization. It follows also that the heavier the rail the more crystalline will be its structure; for it will generally be finished hotter than a lighter one.

"Plate IV. shows the structure of twenty-one different portions of the transverse section of a rail. With the plate is an outline of this section, with corresponding numbers indicating the spots where the photographs were taken. The enlargement is 33 diameters. The rail was finished fairly hot. The section is 80 lbs. to the yard. As we proceed inward towards the center of the head we

notice how the structure, at first very close, gradually becomes coarsely crystalline.

"It is a necessary consequence of such variations of structure that the physical properties of the different parts of the rails should vary accordingly. As might be expected, the crystalline structure of the center of the head will show less power of elongation and of reduction of area than the closer structure of the side of the head and especially of the extremities of the flange. Test bars were cut from three different locations and submitted to tensile strain. The results agreed remarkably well with the microscopical evidences.

"Thus it appears that so far as physical properties are concerned a steel rail is a somewhat heterogeneous body. This is the more apparent in rails finished unduly hot. In colder-finished rails the difference of structure of the various parts (and consequently the difference in their physical properties) is much less pronounced.

"The accompanying table gives the results of the testing of bars cut respectively from different parts of both hot and cold-finished rails. The figures of the first column give the size of the grain in square millimeters. magnified 100 diameters. We shall explain later how they were obtained.

The figures of this table agree very closely with our proposition that the colder the rail is finished the smaller its grain, and the smaller the grains the higher its power of elongation and of reduction.

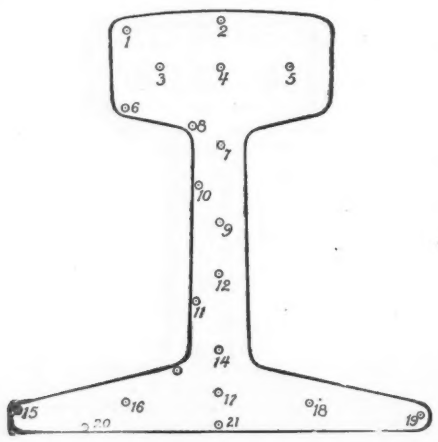
"It follows from the heterogeneous structure of a rail that the deflection which a bending test will give before breaking will greatly vary according to the region from which the test is cut. It is therefore, highly important in comparing the toughness of rails by means of such tests to cut them always from the same parts. A bending test taken from the center of the head will generally make a poorer showing than those from the side of the head, the web or the flange; but it will more readily reveal the hurtful crystallization caused by too high a finishing temperature.

"Another consequence of this variation in the structure is that when rails are in use, some portions, more yielding, will not bear their fair share of the stress, but throw it partly upon the other more resisting portions, thus reducing the power of endurance of the rail as a whole.

"It seems, then, that the ideal rail should have as homogeneous a structure and as small a grain as possible. Theoretically we should get nearer to this result by finishing cold (not so cold, however, as to produce the brittleness due to cold-rolling) and cooling quickly; or by reheating the rail to a temperature from which on subsequent cooling the metal does not crystallize."

PHYSICAL TESTS OF HOT AND COLD-FINISHED RAILS.

Test Bars Cut From—	Size of grain, sq. mm. magnified 100 diam.		Tensile strength, lbs. per sq. in.		Elongation, per cent. of length.		Reduction, per cent.	
	Finished hot.	Finished cold.	Finished hot.	Finished cold.	Finished hot.	Finished cold.	Finished hot.	Finished cold.
Center of head	148	86	99,900	100,900	15	20½	20	23
Side of head	118	75	100,000	103,900	19	20	22	32½
End of flange	62	35	102,900	105,600	22½	21	35	39



In addition to this Mr. Sauveur gave a very interesting account of some experiments on the relation between the physical properties of steel and its microstructure, showing by a diagram the relation between the size of the grain and the tensile strength of the steel.

Prof. Henry M. Howe gave a very instructive paper on the heat treatment of steel at this same Congress, and in his presidential address to the American Institute of Mining Engineers, said:

"The papers of the present year, which I proposed to group together under the title of the 'Physics of Steel,' are not the only evidence of the serious study this most important question is receiving. One result of these studies will be a better adaptation of the chemical composition of the metal to the needs of each special use; but a far more important result, I believe, will be a great improvement and extension of the methods of treatment by heat, at least for steel, and possibly for the other metals of construction.

"In the hardening and tempering of tools, in the annealing of steel castings, in the chilling and annealing of car wheels and other cast-iron objects, and in the manufacture of guns, projectiles and armor we have already extensive and careful if empirical heat-treatment. Even in the manufacture of rails, plates and tires we have been in a measure forced into a kind of heat-treatment; for we may class under this head the regulation of the finishing-temperature.

"The evidence before us scarcely permits us to doubt that, by proper treatment of steel, we may at will very greatly increase the tenacity, the elastic limit, the ductility, the resistance to wear, or a combination of these properties; and that we can thus fit our metal much more closely to its needs, with the result of greatly improving the objects which it forms, or of greatly lightening them. For this there is good reason to believe that relatively simple and inexpensive methods will suffice. If such methods of greatly increasing the usefulness of steel lie before us, simply awaiting exploration and application, it is certain they will be explored and applied.

"For instance, a ready and safe means, such as we may hope for, of attaining in steel greater resistance to repetition of stress, should permit us to decrease greatly the weight of many structures, especially of those in which weight is objectionable in itself, as it is in the cases of ships, of bridges, of rolling stock and in many others. We are promised a great increase in the wearing power of rails through lowering their finishing temperature, and by slightly varying that of steel plates it has been found possible to regulate their physical properties.

"In what we have hitherto done in the study and in the application, whether scientific or empirical, of heat-treatment, we have only nibbled; we have hardly done more than to gain an idea of the vastness of the unsailed ocean of usefulness that stretches before us."

Mr. Wm. R. Webster in a paper on "Observations on the Relations Between the Chemical Constitution and Ultimate Strength of Steel," before the Iron and Steel Institute of Great Britain, 1894, in connection with the results of his investigation, gave a table showing the correction found necessary on account of finishing temperature for different thicknesses of material, and said:

"When rolling heavy steel plates trouble is often caused by finishing them at too high a temperature, which gives a material with crystalline fracture, poor reduction of area and poor bends. In order to guard against this and control the finishing temperature we use very light draughts in rolling, and produce as good results in heavy plates as in the light ones. Too much importance cannot be given to the heat-treatment of steel. Mr. H. M. Howe's recent experiments on the subject are of the greatest value, and it is to be hoped that they will be continued on a larger scale in connection with the work of rolling and forging."

The following is taken from the discussion on this paper: "Mr. P. C. Gilchrist, Member of Council, considered that the paper was one of the most important ever received by the Institute. It drew attention in a scientific manner to a great fact that had been well known by all those observers who had been connected with the production and manipulation of steel, the great fact in question being that within certain limits the chemical composition of a piece of steel was of less importance than its physical state. In plain English that meant that in the case of a plate you could make it hard and in an extreme case as brittle as a carrot by improper heating or rolling, and that you can make another piece from the very same plate almost as tough as leather."

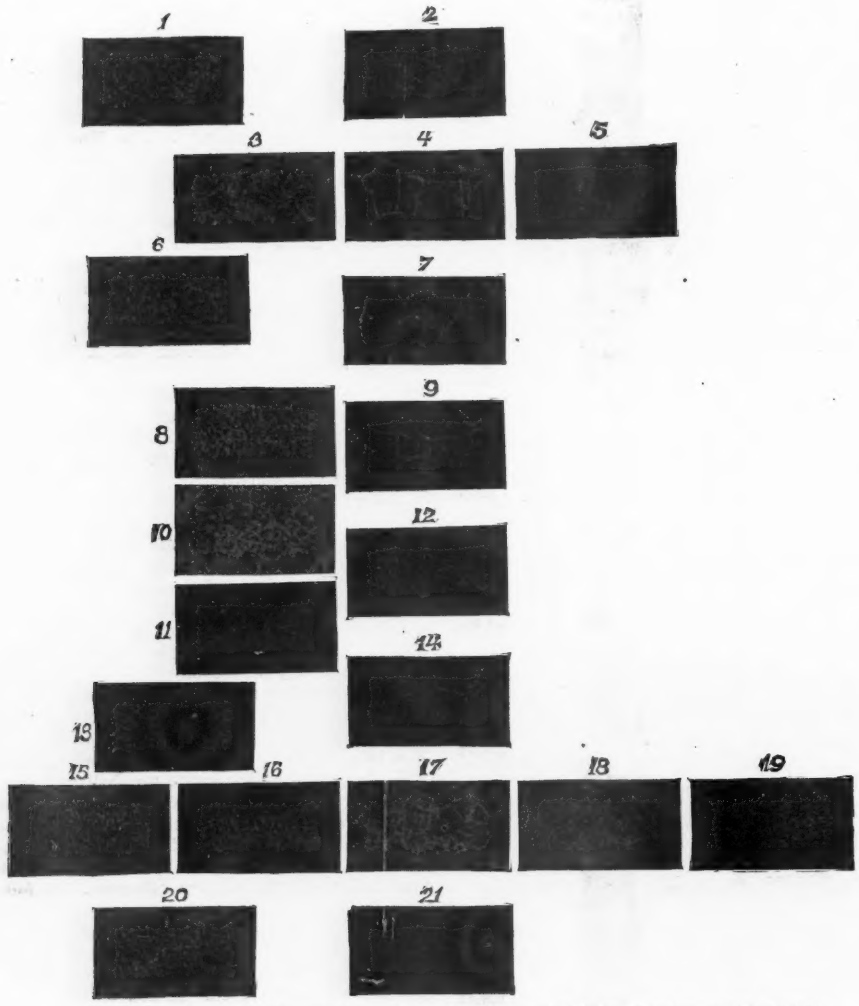


Plate IV., from the Transactions of the Institute of Mining Engineers, Vol. XXII.

(To Illustrate the Effects of Heat Treatment of Steel.)

Inter-Urban Electric Roads in Southern Ohio.

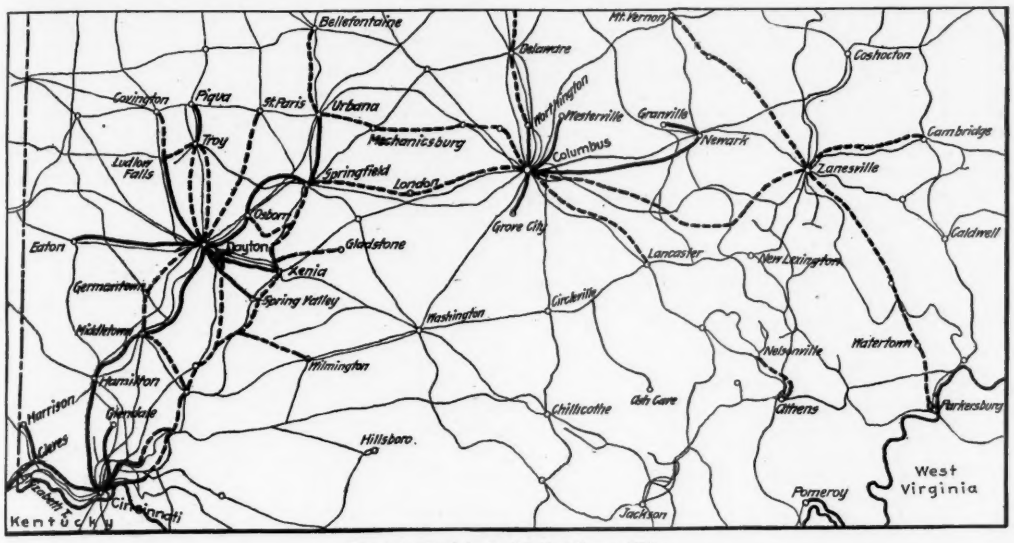
In a recent issue of the *Railroad Gazette** a description was given of the rapidly expanding network of inter-urban electric lines in northern Ohio. The territory in the south of the state around Dayton, Cincinnati and Columbus is another favorite field for the electric railroad. Dayton in particular is coming to be an important center. The Dayton, Springfield & Urbana has just completed its line from Dayton northeast 41 miles via Fairfield, Medway, Sugar Grove, Springfield and Bolusville to Urbana. From Springfield the Columbus, London & Springfield, when completed, will carry passengers on northeast about 50 miles through London to Columbus. This latter company was incorporated in January, 1900, and by the terms of its franchise must begin service within the city of Columbus by July 1 next. The Dayton, Springfield & Urbana has a branch projected from Osborn southeast 12 miles via Byron and Yellow Springs to Xenia. Right of way has been granted for another branch from Urbana north to Bellefontaine. The Dayton, Springfield & Urbana Southwestern, recently incorporated by men interested in the above road, proposes to build from Springfield south through Yellow Springs to Xenia. Dayton and Xenia are already connected by the Dayton & Xenia Traction with a line 17 miles long. This company has absorbed the Dayton, Spring Valley & Wilmington Transit, whose line runs from Dayton southeast 18 miles to Spring Valley. The Rapid Transit of Ohio also connects Dayton with Xenia by a line completed in March last year.

Southward from Dayton runs the Southern Ohio Traction. It extends 52½ miles to College Hill, a sub-

*See article entitled "Inter-Urban Electric Railroad Development in Northern Ohio," issue of April 26, page 281.

urb of Cincinnati, and was formed in January, 1900, by the consolidation of three companies. An extension is proposed from Dayton north 19½ miles to Troy. M. J. Mandelbaum, F. T. Pomeroy and other Cleveland men who are developing the Cleveland, Elyria & Western are interested. The Mill Creek Valley Street also runs as far north from Cincinnati as Glendale, about 12 miles. From Cincinnati westward the Cincinnati, Lawrenceburg & Aurora Electric runs along the Ohio River 38 miles to Lawrenceburg, Ind., with a branch from Cleves northwest to Harrison. The capital stock has recently been increased for further extensions.

The Dayton & Germantown Traction was incorporated in July, 1900, and is building from Dayton southwest to Germantown. When completed its line will extend to Middletown, 29 miles from Dayton. West from



Electric Railroads in Southern Ohio.

(The heavy solid lines indicate electric roads in operation or practically completed and the broken lines roads building or projected. The routes as laid down between centers are intended to be only approximate.)

Dayton the Dayton & Western Traction extends to Eaton, 25 miles. It has been in operation since June, 1898. The Dayton & Troy Traction is building from Dayton north via Harrisburg, Union, West Milton and Ludlow Falls to Troy, with a northward extension through Pleasant Hill to Covington, in all 35 miles. It was incorporated in January, 1900, and enters Dayton over the tracks of the People's Street, which is owned by the American Railways Co. of Philadelphia. Another road to connect Dayton with Troy is the Dayton & Troy Electric. This is to be a double-track line 20 miles long, and the company expects to complete it in May. The road is being built entirely on a private right of way. Its officers, as well as those of the Dayton & Western, are prominent in the City Ry. Co. of Dayton. At Troy these companies connect with the Miami Valley, which owns a line extending north eight miles to Piqua.

Two or three other companies are known to have plans for building in this territory around Cincinnati and Dayton. The Little Miami Traction was to begin surveys in January for a line from Springfield southwest 72 miles to run through Xenia, Lebanon and Dayton to Cincinnati. The Dayton, New Carlisle & St. Paris Traction proposes to build from Dayton northeast 34 miles via New Carlisle to St. Paris. The Central Realty Bond & Trust Co. of New York is trustee for a mortgage to cover $1,350,000 bonds to be used in building the road.

Notice was made above of the Columbus, London & Springfield, which is to take passengers from the Dayton and Springfield district into Columbus. From Urbana, the present terminal of the Dayton, Springfield & Urbana, the Urbana, Mechanicsburg & Columbus proposes to run east about 40 miles via Mechanicsburg, Plain City and Dublin to the Capital City. The company was incorporated last year and preliminary surveys are reported made. North from Columbus the Columbus, Delaware & Northern Interurban proposes to begin building at once through Worthington, Flint and Delaware to Marion. Representatives of the Columbus, London & Springfield and the Dayton, Springfield and Urbana have been added to the board of directors and it is stated that the three roads will eventually be consolidated to form part of a through line from Cleveland to Cincinnati. East from Columbus will run the Columbus, Buckeye Lake & Newark. It is to go to Newark with a branch to Buckeye Lake, a proposed pleasure resort, in all 40 miles. Of this about 15 miles was graded at last report. From Newark the Newark & Granville Street runs northwest about 10 miles to Granville.

The Columbus, Winchester & Lancaster Traction has recently been incorporated to build from Columbus southeast about 30 miles via Groveport and Winchester to Lancaster, paralleling the Hocking Valley. From Nelsonville, a few miles further southeast on the Hocking Valley, the Athens, Nelsonville & Hocking Valley Traction has been incorporated to build on southeast to Athens. From Zanesville as a center the Black Diamond Traction Co. proposes an elaborate system of electric roads. One line is projected west about 20 miles to Somerset, with Columbus as the ultimate point; another line is proposed to run from Zanesville northwest about 50 miles via Fallsburg and Martinsburg to Mt. Vernon; another is projected east 27 miles via Norwich and New Concord to Cambridge, while a fourth is projected from Zanesville southeast 63 miles via Meigsville and Watertown to Belpre opposite Parkersburg, W. Va.

Heavy Railroad Work in Virginia.*

BY EMILE LOW, *M. Am. Soc. C. E.*

The writer desires to draw attention to some heavy construction in Virginia, on the line of the Clinch Valley Division of the Norfolk & Western Railroad (now Railway). The line traverses the mountain region of Southwestern Virginia, forming the western slope of the Alleghany Mountains. Some of the mountain peaks in this section reach an altitude of nearly 5,000 ft. The line generally follows Wright's Creek (a tributary of the New River), Clinch River, Thompson's Creek and Guest's River, the two latter being tributaries of Clinch River. Very heavy work occurs at the divides where the line passes from one valley to another; especially is this the case between St. Paul and Colburn. The cost of the heaviest sections, usually one mile in length, in round numbers, was as follows: Section 57, $100,000; Section 81, $121,000; Section 85, $166,000; Section 86, $114,000; and Section 89, $153,000. Six tunnels ranging in length from 327 to 1,925 ft., occur on the sections mentioned, hence the large cost. On the hundred miles there were 25 sections the cost of which ranged from $40,000 to $166,000, with a total cost of $1,718,000, or an average of nearly $70,000 per mile, the cost of the track not being included.

It is the writer's intention, however, to mention more specifically the construction of Sections 31 to 35, inclusive, between Pounding Mill and Cedar Bluff, where the construction consisted almost wholly of open excavation and bridging. On these sections there are only three short tunnels, 155, 437 and 540.5 ft. long, respectively. The railroad between the points mentioned follows the valley of the Clinch River, a tortuous mountain stream, which cuts its way through a range of limestone hills, known locally as Kent's Ridge. The river is crossed ten times. Near Pounding Mill five crossings occur within half a mile; the other five crossings occurring within the last 6,000 ft., near Cedar Bluff.

The course of the Clinch River east of Pounding Mill is comparatively straight, but the south bank is an almost perpendicular cliff for the distance mentioned. The course of the river just west of Pounding Mill is very sinuous, the distance between Bridges 1,338 and 1,342 (known as Crossings 9 and 13, of Clinch River), measured along the center line of the railroad is 2,700 ft., while the length of the stream between the same points is about 7,600 ft., or nearly three times as long.

As previously stated, the river is crossed five times in about half a mile. The crossings range from 33 to 44 ft. in height, between base of rail and water surface. The bridges are Howe trusses, resting upon masonry substructures. For the higher bridges, trestles are used for the approaches on either side of the main span.

There being practically no embankment on this 2,700-ft. section, nearly all the material from the excavations had to be wasted. The narrow ridge between Bridges 1,340 and 1,341 is pierced by a short tunnel known as Tunnel No. 1.

Some of the bridges near Cedar Bluff are located on curves, the others on tangents, and T-walls were here substituted for the short spans at the ends.

The strata in the section mentioned dip to the south, the dip ranging from 30 to 45 deg. This fact largely increased the quantities of excavation, as the cuts, upon being excavated, assumed slopes on one side corresponding to the dip of the rock, the excess material beyond the prescribed slopes being literally solid rock slides—an uncommon kind of slide. In one case a slide of this character occurred after the track was laid. This was in the cut between Bridges 1338 and 1339. One night, during a heavy rain, the upper side of the cut slid in, covering the track to a depth of over 20 ft., for a length of about 400 ft., about 90 per cent. of the slide being composed of solid rock. . . . Tunnels Nos. 2 and 3 were located on 8 deg. curves. As the tunnels were worked from both ends it was very essential that the alignment should be correct. Previous to construction the center line was carefully re-run, all measurements being made with steel tapes. At convenient places outside of the tunnel portals, points on the center line were established, and lines tangent to the curve run out to intersections. The tangents were carefully measured, and also the long chords and versed sines. After all measurements were found to agree with the theoretical calculations, the line was carefully referenced and construction started. It is quite needless to say that the work from each end met, absolutely.

The price paid for tunnel excavation, proper, was for the material only between the neat lines of the prescribed cross-section. On account of the inclination of the strata passed through, there were more or less falls, or breakage, as it was termed. The contractors were paid for this excess material, beyond the prescribed section, at a reduced price. The percentages of this breakage, as compared with the neat or prescribed sections, for the different tunnels were as follows: No. 1, 19 per cent.; No. 2, 16 per cent.; No. 3, 24 per cent. . . .

Table No. 1 gives in detail the quantities and cost of the work.

The cost of track is not included in Table No. 1.

It will be noticed that a large percentage of the material excavated was solid rock, the earth and loose rock being merely thin coverings overlying the solid rock. The various percentages of the excavation were: Earth, 10.2; loose rock, 9.6; and solid rock, 80.2. The following are the contract prices paid for the various items of work:

Earth excavation	$0.18 per cu. yd.
Loose rock excavation	0.35 " "
Solid rock excavation	0.75 " "
Tunnel excavation	3.25 " "
Tunnel breakage	1.50 " "
Rock-face ashlar masonry	8.00 " "
Broken range masonry	6.00 " "
Box culvert masonry	3.00 " "
Dry paving masonry	1.50 " "
Rip-rap masonry	1.00 " "
Clearing and grubbing	30.00 per acre

These prices were fixed by the chief engineer, and were the prevailing prices for the whole line. The cost of the explosives for the open excavation was approximately, 5, 10 and 15 cents for earth, loose rock and solid rock, respectively. The wages paid were $1.20 per day for day laborers, who were nearly all negroes, and $3 per day for foremen.

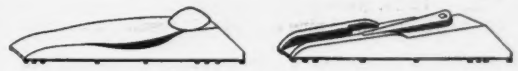
TABLE NO. 1.

Section Number.	Open Excavation.				Tunnel Excavation.		Masonry, all Classes.	Clearing and Grubbing.	Cost, Including Bridges.
	Earth.	Loose Rock.	Solid Rock.	Total.	Regular.	Breakage.			
	Cubic Yds.	Cubic Yds.	Cubic Yards.	Cubic Yards.	Cubic Yds.	Cubic Yds.	Cubic Yds.	Acres.	
31	6,347	4,922	85,623	96,892	....	....	928	7.09	$76,000
32	10,599	8,477	63,022	82,098	1,514	288	1,019	9.61	82,000
33	1,100	7,271	27,029	35,400	....	....	146	12.19	24,000
34	4,924	4,619	31,171	40,714	5,252	821	1,520	5.09	66,000
35	6,651	2,560	26,528	35,739	6,126	1,467	1,742	4.47	70,000
Totals	29,6 1	27,849	233,373	290,843	12,892	2,576	5,355	39.05	$318,000

*A discussion of Mr. Boggs' paper on "Heavy Railway Construction in Wyoming," was printed by abstract in the *Railroad Gazette* of March 15, and in full in the *Proceedings Am. Soc. C. E.* for February, 1901. This discussion is printed in the *Proceedings* for May.

Snow Car and Locomotive Replacers.

The Handy Car Equipment Co., Old Colony Building, Chicago, has been made the sole agent for the Snow car and locomotive replacers which are now in use on a number of roads. They consist of a male and a female frog, the latter having a switch or tongue which enables it to be used either right or left. This switch or tongue



Male Frog. *Female Frog.*

Snow Car and Locomotive Replacers.

is pivoted on a 1¼-in. bolt, and is also countersunk into the heavier casting, thus relieving the strain on the bolt. One of the advantages claimed for this frog is that the maximum height, instead of being in the middle, is at the

end of the replacer, thus providing a very gradual grade. This gradual incline also permits the replacer to be put underneath the wheels at the thin end so as to clear brake hangers and sand pipes. There is no beveled surface and no side pressure to push the frogs out of place, and it is not intended that they be spiked to the ties or clamped to the rails. The wheels in mounting, bear on the tread instead of the flange, thus obviating any danger of the flanges breaking. The replacers may be placed at any angle to the rail and can be used for mounting with leads of rails when the trucks are off the ties. They are made of basic steel, weight 215 lbs. a pair, and will bear the weight of the heaviest locomotive. As used the female frog is placed between the rails and the tongue is set to guide the wheels which are off inside of the rails. The male frog is set with the thin end close in to the tread of the wheel, allowing the flange of the wheel to project down the side of the frog.

Standard Transfer Bridge for Car Floats—New York Central & Hudson River Railroad.

Car floats, to avoid transshipment of freight delivered at the water front freight houses of New York, have become standard, and a method of easy transfer from the float to the shore is necessary. The common way of transferring is by bridge, hinged at the shore end and arranged to raise and lower at the water end to suit the tide level. In New York the tide varies from about 5 ft. to 7 ft., and the transfer bridge must have a vertical movement at the outer end somewhat greater than this range.

A common method of constructioon is a bridge hinged at the shore end and resting on a floating pontoon at the water end, where it is steadied by hangers attached to a gallows frame. These hangers can be adjusted to the rise and fall of the pontoon. The bridges have sometimes been made of metal, though wood is generally used, corrosion being the objection to iron and steel.

A new and standard form of bridge has recently been designed for the New York Central, under the direction of the Chief Engineer, Mr. Wilgus, who has furnished drawings from which the accompanying illustrations were made. It is built of timber and without pontoons. The slip has a clear width of 42 ft. at the shore end, and is formed of piles protected by planks and stiffened by diagonal and straight bracing; ending in a closely driven nest of piles at the outer end, bound with chain. At the sides of the bridge proper there are rows of piling, that become massed at the outer end in order to carry the supporting frames of the bridge. At the shore end the approaching tracks are carried on heavy stringers supported on piles.

The general construction of the bridge, apron and operating machinery is shown in the illustrations. Fig. 1 is a longitudinal section and plan of the bridge and apron with an elevation of part of the operating machinery. The trusses, of which there are three, are shown. The floor is suspended from beneath the truss, the timbers being 17½ in. deep. Two lines of single track are laid, as shown in Fig. 1, directly upon these floor timbers. The floor is planked over outside of and between the rails.

The hinge at the inner end is semi-cylindrical, and rests upon the stringers, at E Fig. 1. The outer end is carried by the eye-bars D, the upper ends of which are attached to heavy screws that can be raised and lowered by the nut F. These screws are 6 in. in diameter, and are cut with a thread of one to the inch. The nuts may be driven by hand if the power-driven machinery breaks, but ordinarily they are operated by an electric motor or gasoline engine. This engine or motor is placed at H, Fig. 2, and drives the countershaft I, by belt. The countershaft carries a clutch engaging with either of two loose pulleys. A cross and an open belt leads from these two pulleys respectively to pulleys upon the shaft K, to which is keyed a pinion meshing with a gear on the shaft carrying the worm G, Fig. 1. From the worm gear the nut F receives its motion, and the screw is raised or lowered 3¾ in. per minute.

The nuts rest upon a heavy framing that will be considered later. This combination would sustain the weight of the bridge and its moving load, but is never called upon to do so. Nearly the whole weight of the outer end of the bridge is counterbalanced by the counterweights shown in the plan, Fig. 1, on either side of the bridge. There are eight weights in all, held by as many wire cables leading up from close beside the outer ends of the trusses. There are two for each side truss and two on each side of the center truss. The leading of these cables and the arrangement of the screws and suspending eye-bars are shown in the section, Fig. 3.

Beyond the bridge is the apron. The method of suspension and the relation of operating machinery is shown at the left of Fig. 4. The apron is made of 18 pieces of 16 in. x 6 in. yellow pine, stiffened by eight 2-in. truss rods, as shown in Fig. 5. These truss rods drop down beneath 12 in. x 12 in. yellow pine cross-ties, and the floor is of 6 in. x 8 in. yellow pine ties bound together with white oak stringers.

The shore end of the apron is carried by six wrought iron hinges like that shown at the left of Fig. 5. The outer end is held by a sling N, from which a wire rope leads to a counterweight. The adjustment of height is made by a ferry winch O, Fig. 4, that is held by friction. No pawl is used on this, as it is intended that the float shall carry the unbalanced weight of the apron with its load.

The location of tracks on the apron is shown in Fig. 6. The right hand track, looking shoreward is single. The left hand track has a switch, and leads to two lines of rails on the standard float. At the edge of the apron the rails may be adjusted laterally to meet those of the float, by the ratchet screws shown at P. The two outgoing lines at the left are held together by tie bars, so that one line after the other may be adjusted.

The bolts Q, of which there are four, hold the apron and the float rigidly together vertically and laterally, through a slight hinge-like motion between the two is possible.

There are two overhead trusses used to carry the suspending mechanism of the outer end of the bridge. One is placed with its center back of, and the other on BB of Fig. 4. The first of these is shown in detail, on an enlarged scale, in Fig. 7. It is formed of two separate trusses with upper chords of 6-in. x 12-in. yellow pine, joined to the lower by 12-in. x 14-in. braces and vertical suspension rods 1 in. in diameter and diagonals of 1¼ in. The wire ropes used for the counterbalance are 1⅜ in. in diameter, and are led over the pulleys, as shown at the right. Four of the counter weights weigh 19,750 lbs. each, and four of them about 14,000 lbs. each, making a total of 135,000 lbs. used to counterbalance the outer end of the bridge itself.

The other truss Fig. 8, carries the operating machinery. It is deeper, being 10 ft. over the chords, but, like Fig. 7, has two separate trusses between which the suspension cables and eye-bars move. The hoisting machinery, also, is shown in Fig. 8. The shaft G extends, from the right hand suspension nut, parallel to the center line of the truss, to the driving gear at the left. It has a worm for each nut. These nuts with their screws have single thread of 6 in. outside diameter and a pitch of 1 in.

The worm gears are of phosphor bronze, with 36 teeth cut to a pitch of 1½ in., and with a face of 5¾ in. The worms are of hardened steel, and have a pitch diameter of 6.7 in. The speed of the worm shaft is 135 revolutions per minute, giving a vertical motion of 3¾ in. per minute to the end of the bridge, as already noted.

This shaft is also fitted with a large crank, so that the bridge may be raised or lowered about ¼ in. per minute by hand. The shaft has a driven gear 2 ft. diameter and a driving pinion 8 in. diameter. The jack shaft J runs, normally, 337½ r. p. m. The worm-shaft and countershaft are 3 in. and 2½ in. diameter, respectively, both being made of cold rolled steel. Levers for working the clutches on the jackshaft are operated from a point near the engine house door. The winch for hoisting the apron has two counterbalance weights weighing about 21,000 lbs. each.

The float is held to the bridge by two gears—L and M of Fig. 1. The former is the moving gear, and its line exerts an outward pull upon the end of the float, tending to check any tendency to sway. The construction of this moving gear is given in detail in Fig. 9. The winding gear consists of a spool P, 7 in. diameter, on whose shaft is keyed a spur gear wheel 36 in. in diameter and 4 in. face, containing 45 teeth, driven by a back gear with gears of 10 and 30 in. in diameter, the former meshing with the spool gear and the latter with a pinion on the wheel shaft, and having 61 teeth. The pinion on the wheel shaft has 18 teeth, and is 8½ in. in diameter, with a 4-in. face. The diameter of the wheel to the outer end of the spokes is 5 ft., so that its effective diameter may be taken at about 4 ft. 6 in. With these proportions each 50 lbs. of pull on the spokes gives a stress of 3,430 lbs. on the mooring line, if the latter is assumed to be 3 in. in diameter.

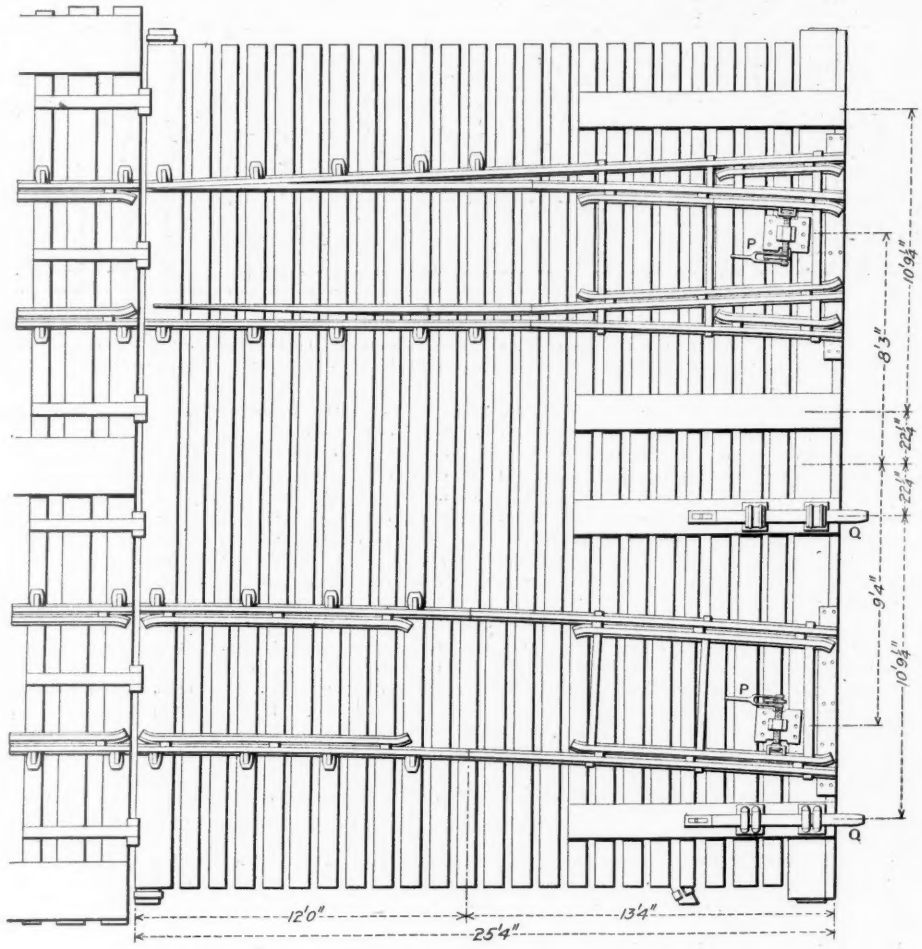


Fig. 6.—Plan of Transfer Apron, Showing Track Arrangement.

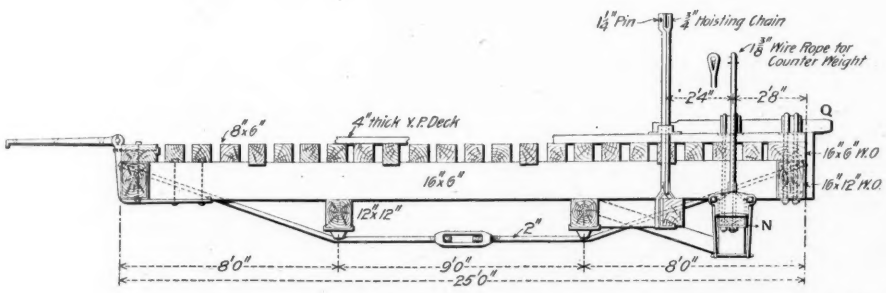


Fig. 5.—Cross-Section of Apron.

The line is held taut by the pawl and ratchet. The former can be thrown out of gear by the slide R, which, by means of the levers to which it is attached and the stirrup S, lifts it.

The other gear Fig. 10 is known as the snubbing gear, and its line leads straight out to the float, parallel to the center of the bridge. The construction varies somewhat from that of the mooring gear in that the wheel stands at right angles to the center line of the bridge instead of parallel to it. The winding is therefore done through bevel gearing. The snubbing gear is used solely to hold the end of the float against the apron and prevent that separation which tends to occur while cars are passing from one to the other. It is somewhat of an innovation to do away with the pontoons at the outer end of bridge, but experience has demonstrated the propriety of this, and the design of bridge illustrated has been adopted as standard.

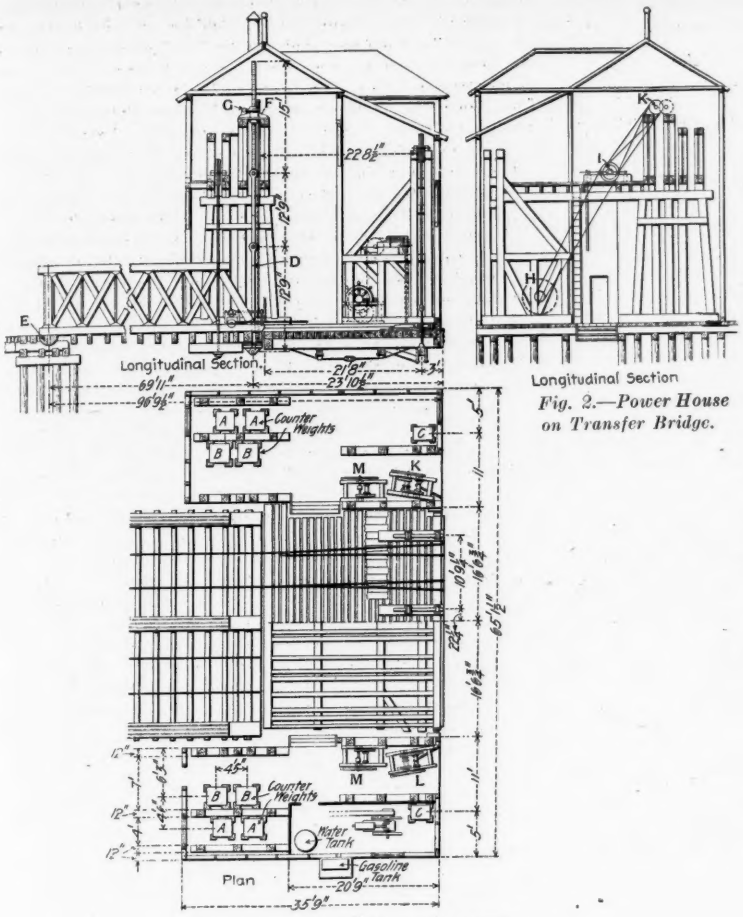


Fig. 1.—Transfer Bridge and Apron.

Fig. 2.—Power House on Transfer Bridge.

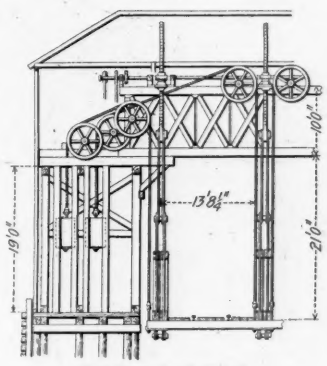


Fig. 3.—Suspension Gear for Transfer Bridge.

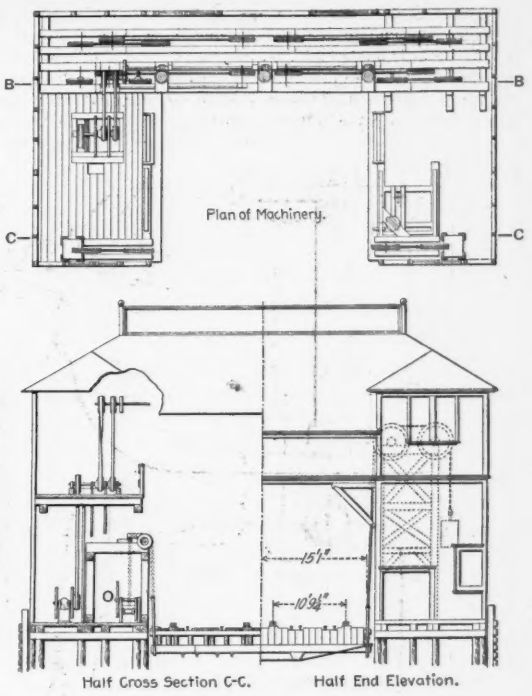


Fig. 4.— Suspension Gear for Apron.

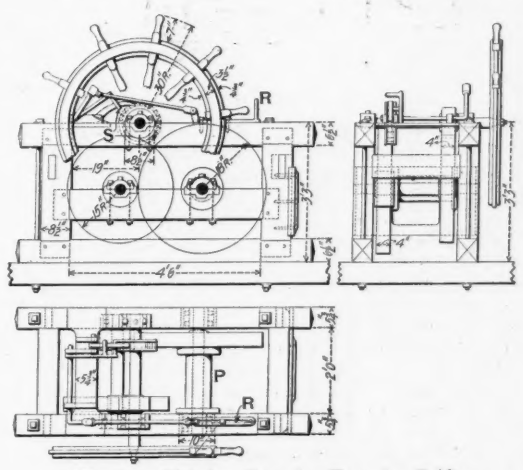


Fig. 9.— Mooring Gear for Transfer Bridge.

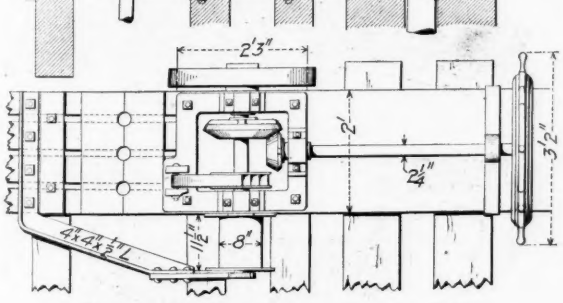


Fig. 10.—Snubbing Gear for Transfer Bridge.

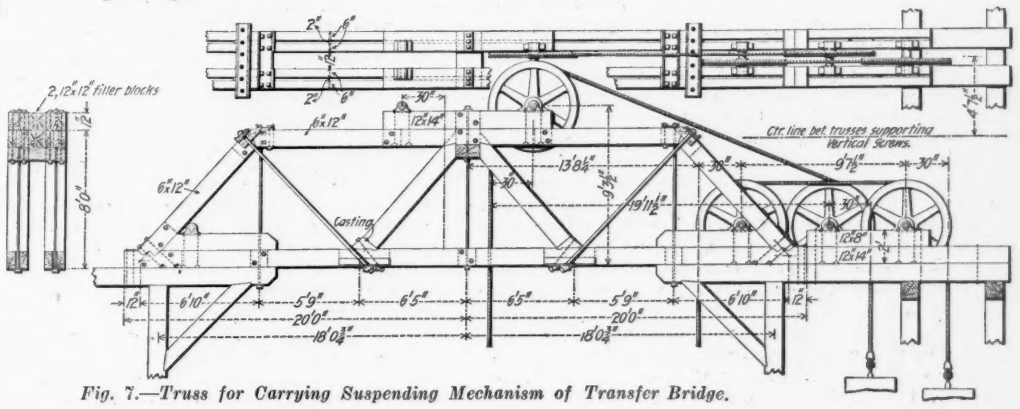


Fig. 7.—Truss for Carrying Suspending Mechanism of Transfer Bridge.

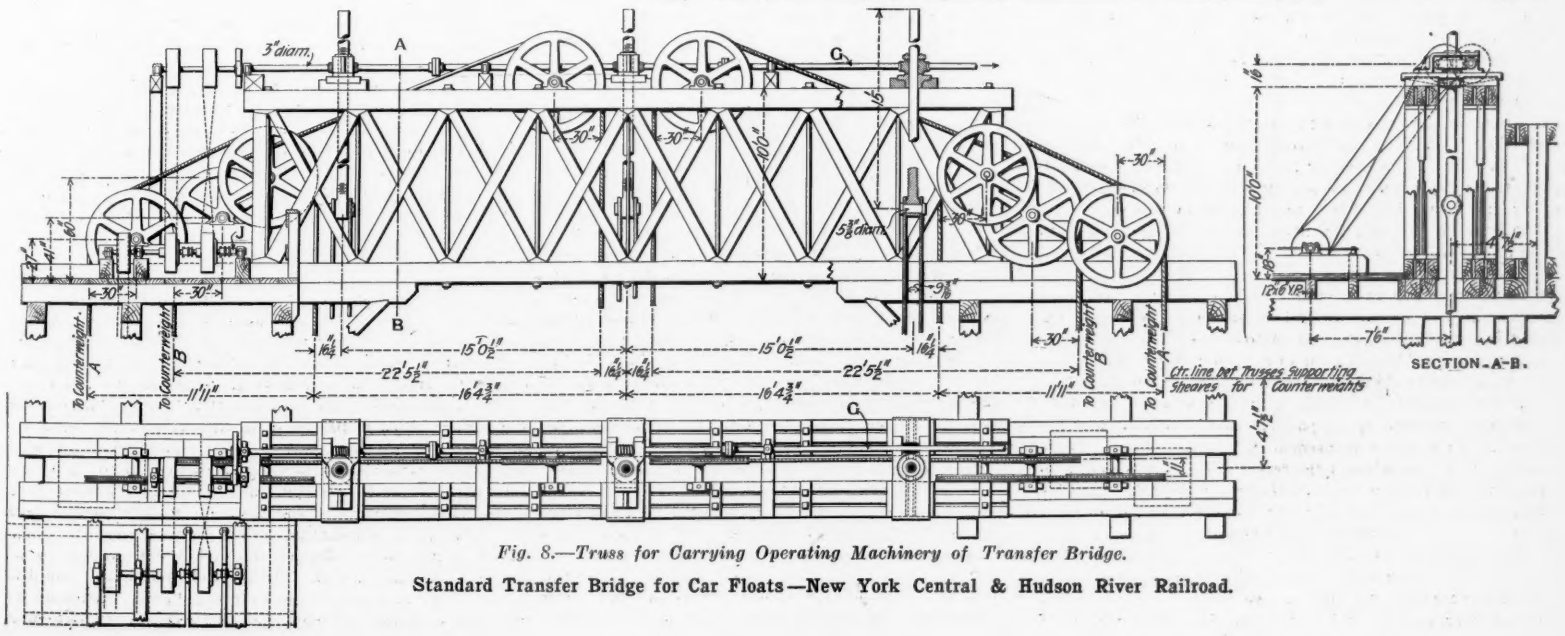
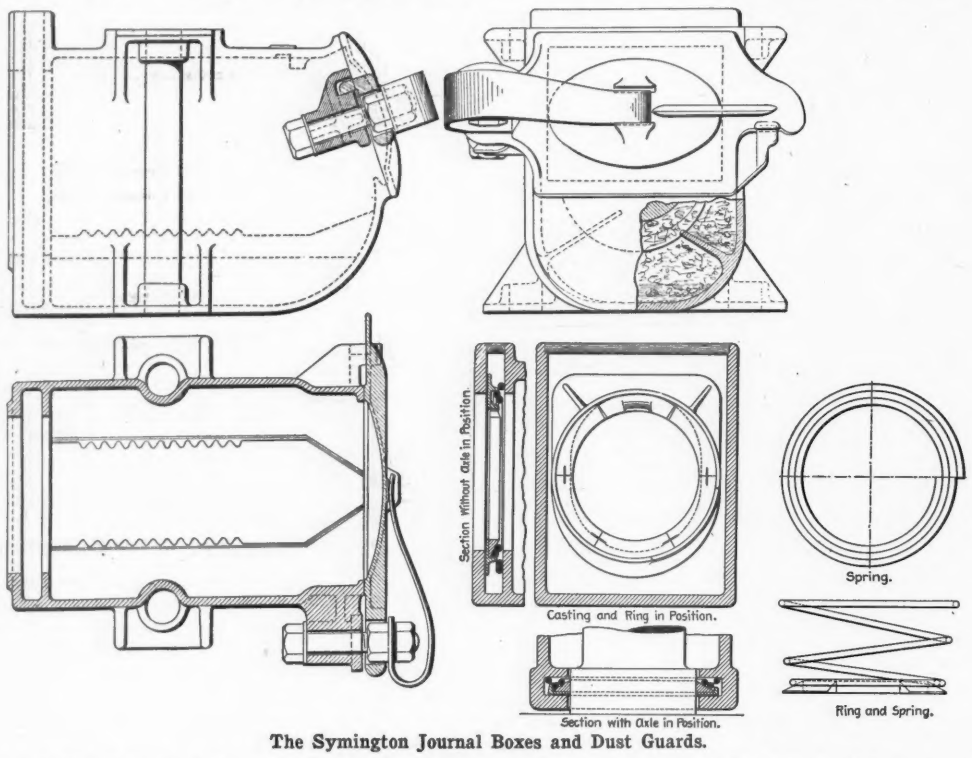


Fig. 8.—Truss for Carrying Operating Machinery of Transfer Bridge.

Standard Transfer Bridge for Car Floats—New York Central & Hudson River Railroad.

The Symington Journal Boxes and Dustguards.

The accompanying illustrations show journal boxes and dustguards made by T. H. Symington & Co., of Baltimore, Md. They were designed and patented by Mr. Symington (lately Superintendent of Motive Power, Atlantic Coast Line) and have but recently been put on the market.



The Symington Journal Boxes and Dust Guards.

We are informed by the designer that he has run a car equipped with these journal boxes in the sandy country of the South for six months without opening a journal box.

The boxes are made of malleable or gray iron, for arch bar or pedestal trucks, and the joints on the box face and lid are machined. The lid is solidly supported on each side, as shown by the illustration, and is held by a long heavy spring giving a central pressure on the lid. A noticeable feature of the box is the ribbed interior by which the packing is held up to the journal and prevented from wadding in the bottom or in the upper corners at the journal. The central pressure of the spring and the machining of the box face and lid prevent the loosening and dropping which sometimes accompanies the use of the side-hinged lid. The spring is unusually long and its free end is normally sprung 1½ in. The spring forms a nut lock on the two nuts at its heel, and when the box is opened the lid, spring and bolt turn together. There is no lip to lift the lid over and the spring is therefore not overstrained by inspectors.

The ribs, in addition to preventing the settling and rolling of waste, facilitate the inspector's work in packing and also furnish supplementary oil reservoirs on each side of the journal at a height from which the oil easily feeds upward. These points are made quite clear from the illustrations. It is claimed that with this box cotton waste can be substituted for wool waste very successfully.

The dustguards fit M. C. B. standard boxes and are arranged to take up ½-in. wear all around the axle. When wheels are renewed it is only necessary to renew the packing ring and the guard itself is therefore of longer life than usual.

The body of the guard is made of a thin soft gray iron casting, with a broad lug bearing on the axle to prevent wear of the casting. A piece of canton flannel is pasted on the back of the guard casting to make a joint against the face of the slot in the box. The packing ring is made in sections of hard wood or vulcanized fiber, and riveted together to make it very flexible. A section is cut out on top to allow the ring, as it wears, to close on the axle. The spring holds the guard solid against the box, preventing any chatter that would cause wear of the axle and guard casting. The spring is made of ¼-in. steel and is held central by the annular ring on the casting, and cannot touch the axle. The spring pressing on the beveled ring exerts a slight pressure toward the center of the axle and keeps the ring, as it wears, in contact with the axle.

The bearing lug on top of the guard casting keeps the opening in the ring on top of the axle. The casting, resting lightly on the axle, breaks the joint where the ring is cut. The guard is free to move sideways in the box, and, as no dust can get in and clog up the bottom of the slot, the guard is never injured when the box is jacked up. In applying the guard the spring is compressed and the entire guard is put into position like a solid wooden guard. No adjustment is needed. The guard should be faced toward the wheel, and the top of the slot completely filled with a piece of wood. If the slot is opened at the bottom the guard should be faced toward the journal.

Travelers going to Chamonix to see Mont Blanc have heretofore left the railroad at Le Fayet, and traveled by coach the remaining 12 miles. An electric road was completed over this route last winter. The road was very costly to build and passes through some magnificent scenery.

Mr. Edison's Storage Battery.

The newspapers have said a good deal within the last few days about the new storage battery which Mr. Edison has invented and developed, and which was recently described in a paper by Mr. A. E. Kenelly before the Institution of Electrical Engineers. The limitations of the ordinary lead battery are weight, rapid depreciation in service and liability to injury in use, to which must, of course, be added the more or less loss of efficiency. Mr. Edison thinks that he has now brought forward a battery that with the same storage capacity as the usual form of lead battery has less than half the weight, costs less originally, is less liable to injury from carelessness, rapid charging and discharging, and will not deteriorate so fast.

The chief materials of the battery are iron and nickel in pure or oxidized form, according to conditions, with an alkaline solution for electrolyte, and it may be said here that the electrolyte need not necessarily be in a liquid form, which gives the battery some of the character of a dry battery, thereby avoiding the probability of splashing objectionable liquids about, much to the detriment both of the battery and its neighborhood.

Mr. A. E. Kenelly gives an illustration of the relative capacity of the new and old batteries by stating that if a 1 h.-p. lead battery were to spend its whole energy raising itself it would rise to the height of from two to three miles, while the new battery, of the same capacity would rise about seven miles. Made in suitable units its lightness facilitates handling, and the relatively dry character of the battery conduces to cleanliness and better conditions generally. The capacity for charging and recharging are of obvious advantage in the saving of time. To make a battery not liable to injury from carelessness is to remove one of the most serious drawbacks to any battery now in use, for many batteries that have been put into service have operated well enough as long as under the direction of the maker, but have come to grief in inexperienced hands. The fact also that a battery can be discharged to or near to its point of exhaustion will save expense and the necessity of skilled watchfulness, which also means expense. It is said that Mr. Edison has fully tested his battery, though, of course, it is still too young to have had the test of hard service; but as he is now preparing to put it on the market it will not be long before its qualities are proved.

Railroads in Burma.

Some interesting particulars of railroad development in Burma are given by the *Times* correspondent at Rangoon. It appears that the completion of the steel viaduct spanning Gokteik gorge, 79 miles from Myohaung, the junction close to Mandalay, has made rapid extension possible, and before long the line will be open to Thibaw, the principal town in the northern Shan States, 127 miles from Mandalay, if not to Lasho, a center of some little importance further east. Railroads joining the ports of Bassein and Moulmein with Rangoon are under way, the former being within measurable distance of completion and the latter under survey.

The length of the Gokteik viaduct is 2,260 ft., made up of 10 spans of 120 ft. each, seven spans of 60 ft. each, and 16 spans of 40 ft. each. A natural bridge across the gorge greatly assisted the work, for the central tower, 320 ft. high, springs from the natural bridge, which is 500 ft. above the water. From the rails there is, therefore, an almost perpendicular drop of 820 ft. The contract for the bridge was obtained by the Pennsylvania Steel Company, British contractors not being "in it." The American firm tendered at £20 a ton; the best English tender was nearly twice as much. The American firm engaged to complete the work in half the time asked in the most favorable British tender. "Of course," says the *Times* correspondent, "the Americans secured the contract, just as about the same time another American firm secured the contracts for 80 locomotives for Indian railroads, of which 20 are now at work in Burma, principally on the extremely heavy gradients (1 in 25) on the Maymyo line; and I believe they are giving every satisfaction to officials who would much prefer to be able to place their contracts with British manufacturers. American rails, too, are being imported into Rangoon; and it is not too much to say that American iron and steel manufacturers have received from the railroads of this province alone in less than two years a sum of £125,000, of which over £80,000 is on account of the Gokteik Viaduct."

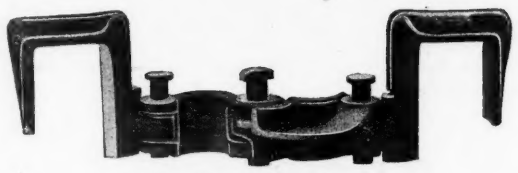
The work on the bridge was started on Feb. 1 last year, when the first shipment of steel from America arrived, and it was completed on Dec. 6, that is, in a few days over 10 months. Thirty American mechanics were engaged and, as there is practically no local labor available, 250 natives of India were recruited in Bombay, Calcutta and Rangoon, half of this number being skilled laborers and the other half coolies. A "traveler," with an overhang of 160 ft., that is, 40 ft. greater than the longest span, was erected on the approach; the first span was lifted into its place and completed; the "traveler" moved its base to the first tower, and the second span was then erected, and so on to the 33d and last span. From the day the work was started there was no serious hitch.—*Transport.*

The Sargent Coupling.

In our issue of Jan. 25, we illustrated the Sargent coupling for use in pulling cars on sharp curves, especially where solid knuckles are used. The advantages of the solid knuckle are so apparent that they will doubtless come into general use. The Sargent coupling shown by the accompanying engravings is the first coupling so improved that it can be used in both pulling and pushing cars. This consists of two open-hearth cast steel dogs which engage the knuckle arms of the coupler heads. A strong flexible connection is made between these dogs by means of two castings, which are curved to follow the contour lines of the M. C. B. knuckle and are joined in the center by a pin. In operation, the dogs are placed over the coupler heads, just back of the knuckle pin and the curved arms are brought together around the face of each knuckle and coupled. This makes such a connection that cars can be pushed or pulled around the sharpest curves. The coupling is designed so that on the sharpest curves there is a space of from 6 to 8 in. between the end sills of the coupled cars.

Pulling.

Pushing.



The Sargent Coupling.

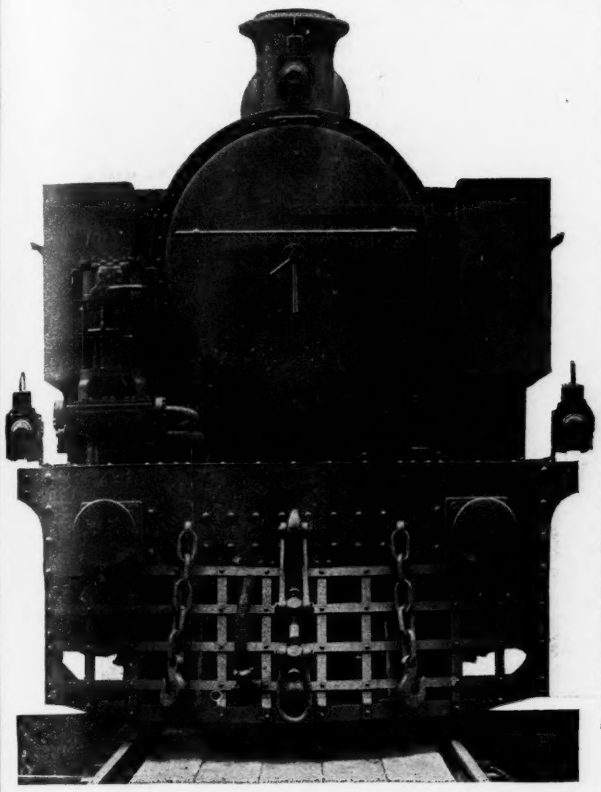
The Lot of a Roguish Shipper in Germany.

The German railroads, as also the International Freight League, have provisions concerning freight shipped with a false statement of its nature (classification) and with false statement of its weight—tricks which have been practiced on this side of the seas. If the freight is described as of a lower class than it really is, when its nature is discovered, there is added to the charge double the amount of the difference in the rates. Similarly, if the weight is understated, double the charge for the actual difference in weight is added.

A doubly smart shipper sent off 10,000 kilograms of fruit. As the rate on fruit in such quantities was 132 marks he economized by entering his consignment as potatoes, charged 56 marks for 10,000 kg. lots. To save

still further, he stated the weight as 5,000 kg., instead of 10,000, though this did not reduce the rate one-half, to 28 marks, but only to 41 marks; which, however, was still a pretty good rebate on the railroad's regular rate of 132 marks.

Unluckily for the shipper both falsehoods were detected; but, strange to say, there arose a difference of opinion as to the amount of the penalties incurred.



Tank Locomotive for the Indian State Railways.

One would reckon it as follows. To be added for insufficient weight:

10,000 kg. potatoes, at 0.56	56 marks
5,000 kg. potatoes, at 0.41	41 "
Difference	15 marks

which doubled was given as the addition for false weight. Similarly the difference between 77 marks for 5,000 kg. fruit and 41 marks for 5,000 kg. potatoes or 36 marks was doubled to make the addition for false classification; making the total addition 102 marks to the amount as per shipper's bill. Another would calculate the addition for false weight as above; but for false classification took double the difference between 10,000 kg. fruit and 10,000 kg. potatoes, which amounts to 152 marks, instead of 72, as above.

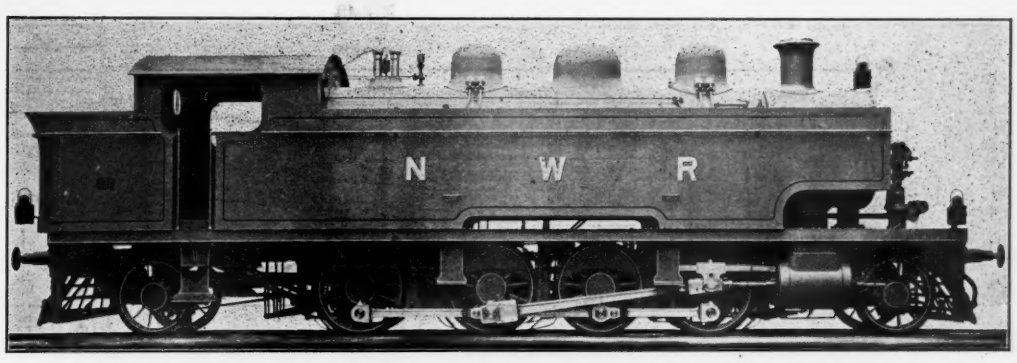
Finally comes an authority on the subject and says that both the above calculations are based on false assumptions. There were two separate and distinct deceits, each calling for its appropriate penalty. For the false statement in weight was incurred the addition of double the difference between the 132 marks due for 10,000 kg. fruit and the 77 marks due for 5,000 kg. fruit, which amounts to 110 marks. For the false classification must be added double the difference between 132 marks for 10,000 kg. fruit and 56 marks for 10,000 kg. potatoes, which is 152 marks; making together 262 marks to be added to the 41 marks of the shipper's bill. He set out to cheat the railroad out of 91 marks and lost 130 marks by the operation.

The American freight men who read this story will doubtless be filled with envy of the European railroad men who can thus call upon the law to prevent false classifications and weights.

Double-Ender Tank Locomotives for the Indian State Railways—North Western Railway.

The accompanying illustrations are of a heavy tank locomotive built by the Pittsburgh Locomotive & Car Works for the Indian State Railways to work on the Mushkaf-Bolan Division of the North Western Railway. Eight of these locomotives have been shipped to Kurrachee, India. As may be noted from the illustrations the design is almost entirely American for parts below the running board, and the boiler and upper works are a compromise designed to meet British ideas. A distinctive feature is shown in the front view of the locomotive, where a duplex Worthington boiler feed pump appears. This is used because in the hot climate in which these engines will work, trouble with injectors is common because of the high temperature of feedwater.

The appearance of unusual width is accounted for when the standard gage, 5 ft. 6 in., of these railroads is remembered. The total weight in working order puts these engines in the heavy weight class, 158,050 lbs. of the total weight of 214,550 lbs. being on the driving wheels. The further weight distribution is good, 23,500 lbs. being on the leading truck wheels and 33,000 lbs. on the trailing truck wheels. The total wheel base is 34 ft. and the driving wheel base 16 ft.; the length over buffers is 45 ft. 1½ in. and the height of the center of the boiler above rails 8 ft. 5 in., the height to the top of the stack being 13 ft. 5½ in. There is a total of 2,090 sq. ft. of heating surface, 148 sq. ft. of which is in the fire-box and 1,942 sq. ft. in the tubes, the grate area being 30 sq. ft. The length of tubes over tube sheets is 14 ft. $^{5}/_{16}$ in. and the tubes are of solid-drawn brass. The fire-box is $88^{1}/_{16}$ in. long, 49⅛ in. wide and is of copper with stay bolts 1 in. in diam., the crown sheet being supported by radial stays. These engines are of more than ordinary interest in that they combine to an unusual degree an assemblage of recognized British ideas, of long standing, with many of the most recent developments of the American types of locomotives. For convenient reference the prominent features here mentioned are included in the general description given in the accompanying tabulation.



Heavy Double-Ender Tank Locomotive for the Indian State Railways.

Sir A. M. RENDEL, K.C.I.E., Consulting Engineer. *Built by the PITTSBURGH LOCOMOTIVE WORKS, Pittsburgh, Pa.*

General Description.

Gage of track	5 ft. 6 in.
Kind of fuel used	Bituminous coal
Total weight in working order	214,550 lbs.
Weight on coupled wheels	158,050 lbs.
Weight on leading trucks	23,500 lbs.
Weight on trailing trucks	33,000 lbs.

Dimensions.

Wheel base, total	34 ft. 0 in.
Wheel base, coupled	16 ft. 0 in.
Length over buffers	45 ft. 1½ in.
Height of center of boiler above rails	8 ft. 5 in.
Height of top of stack above rails	13 ft. 5½ in.
Heating surface, fire-box	148 sq. ft.
Heating surface, tubes	1,942 sq. ft.
Heating surface, total	2,090 sq. ft.
Grate area	30 sq. ft.

Wheels and Journals.

Coupled wheels, number	Eight
Coupled wheels, diameter	51 in.
Coupled wheels, material of centers	Cast steel
Truck wheels, diameter	37 in.
Truck wheels, material of centers	Cast steel
Journals, coupled wheels	8¼ x 10 in.
Journals, leading trucks	7 x 11 in.
Journals, trailing trucks	8 x 11 in.

Cylinders.

Cylinders, diameter	20 in.
Cylinders, stroke	26 in.
Steam ports	16 x 1⅝ in.
Exhaust ports	16 x 3¼ in.
Cylinders and valves oiled by sight feed lubricator.	

Boiler.

Boiler, type	Straight top
Boiler, water test	270 lbs.
Boiler, steam test	200 lbs.
Boiler, working pressure	180 lbs.
Boiler, material in shell	Carnegie O. H. steel
Boiler, material in shell, thickness	⅝ in.
Boiler, diameter of barrel at front sheet	64 in.
Boiler, diameter of barrel at backhead	66½ in.
Horizontal seams	Butt joints and sextuple riveted
Circumferential seams	Lapped and double riveted
Tubes, number	267
Tubes, outside diameter	2 in.
Tubes, length over tube sheets	14 ft. 0 5-16 in.
Tubes, material	Solid drawn brass
Fire-box, length	88 1-16 in.
Fire-box, width	49⅛ in.
Fire-box, material	Copper
Fire-box, staybolts	1 in. diam.
Fire-box, crown	Supported by radial stays

Other Parts.

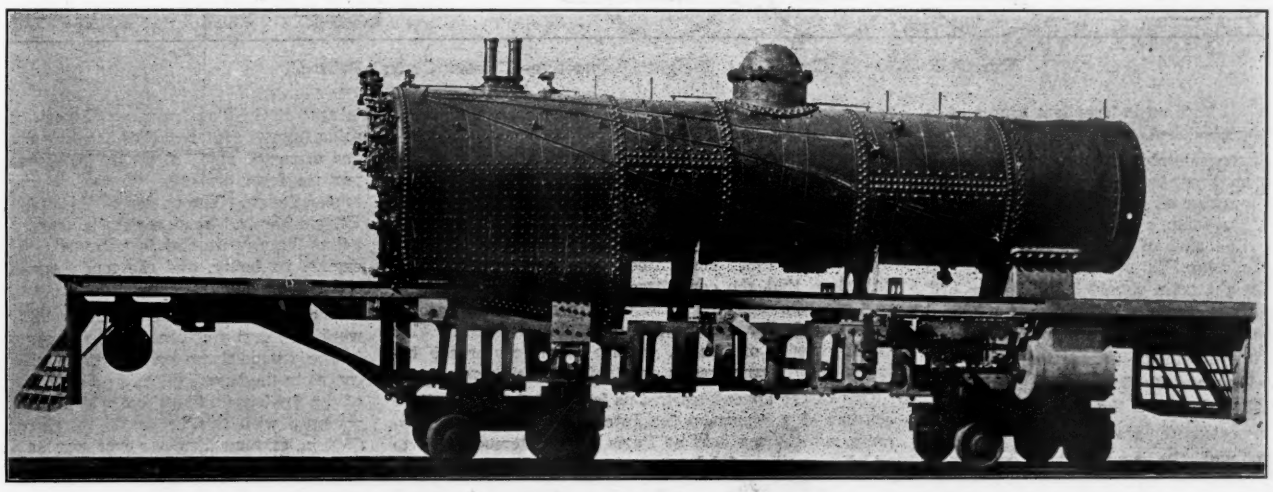
Steam and branch pipes	Copper
Exhaust pipe nozzles	Gun metal
Slide valves	Gun metal
Main axle boxes	Gun metal
Brakes	Vacuum Brake Co.
Tank, type	Side tanks
Tank capacity	2,200 Imperial gallons
Fuel bunker, capacity	13,450 lbs.

American Railway Association.

The spring meeting of this Association was held in New York city April 24, and a summary of what was done appeared in the *Railroad Gazette* of May 3. The full report of the proceedings is now issued.

The first discussion at the meeting was on Rule 14k of the Standard Code, prescribing the whistle signal to be given by one train to notify another train that signals are being carried for a following section. In reply to an inquiry whether this signal ought not be given to trains of superior class when the train giving it is temporarily, by despatcher's order, of superior right, the committee had said that the signal should not be thus given, for the reason that any increase of whistling would be annoying to passengers. Mr. C. D. Hammond, well-known as a champion of correct philosophical reasoning, challenged the position of the committee, saying that if the signal is good for anything, the case specified, in the question which had been proposed, was just the place where it ought to be used. The question is one of safety, not of annoyance to passengers. Moreover, this whistle signal does not ordinarily have to be given near passenger trains. But the Association sustained the committee.

In 1891 and 1892 the Association adopted a series of "essential requisites" of car couplers, train heating, train lighting and power brakes. In view of the fact that experience has developed the need of some changes in these standards, the committee on safety appliances,



Tank Locomotive for the Indian State Railways—Frames and Boiler.

last July, sent out a circular asking about the present practice of the railroads in these matters; and a summary of the replies received (from 84 roads) is given in the pamphlet now before us. This summary takes up about 50 pages, and contains much interesting information. From the replies the committee concludes as follows:

Car Couplers.—Various suggestions have been made as to details, but none which call for action at the present time.

Train Heating.—Some progress is being made in automatic regulation of temperature and improved ventilation. The first requisite should be changed to read "that provision be made for heating cars whether standing or running."

Train Lighting.—Many roads having adopted methods of lighting requiring supply at special points, the requisite that each car shall have an independent source of illumination should be abolished.

Power Brakes.—A considerable number use brakes on truck wheels of locomotives, but the committee does not deem this a requisite under all conditions. Requisites 3, 4 and 7 read: "3: conductor's valve should be within control throughout the length of the car. 4: conductor's valve should be self-closing. 7: . . . power brakes on all the cars of a freight train should be made use of." The committee believes these requisites not essential under all conditions, and recommends their elimination.

The committee has obtained information as to the amount of inter-locking and block signaling in use, but cannot report the statistics until the next meeting.

The report of this committee was adopted as a whole without discussion, and the amendments concerning couplers, heating, etc., are thus approved, and the standards of the Association have been accordingly changed.

The report of the committee on Standard Dimensions of box cars, of which committee Mr. J. J. Turner is Chairman, is very full and complete. The essential feature of the problem, which is to get the general freight agents to revise their rates so that shippers, and agents anxious to please shippers, will not constantly desire larger cars than they can get, has been thoroughly investigated and elucidated in the report. The report is accompanied by elaborate tables showing the condition of the official, the Western and the Southern classifications as regards bulky articles, the number of cars of different lengths now in service, the cubic capacity of a great variety of cars and the ratio of increase of large cars since 1896. The committee also presents a table illustrating the effect of various rates of increase per linear foot on the minimum weights for cars of different lengths.

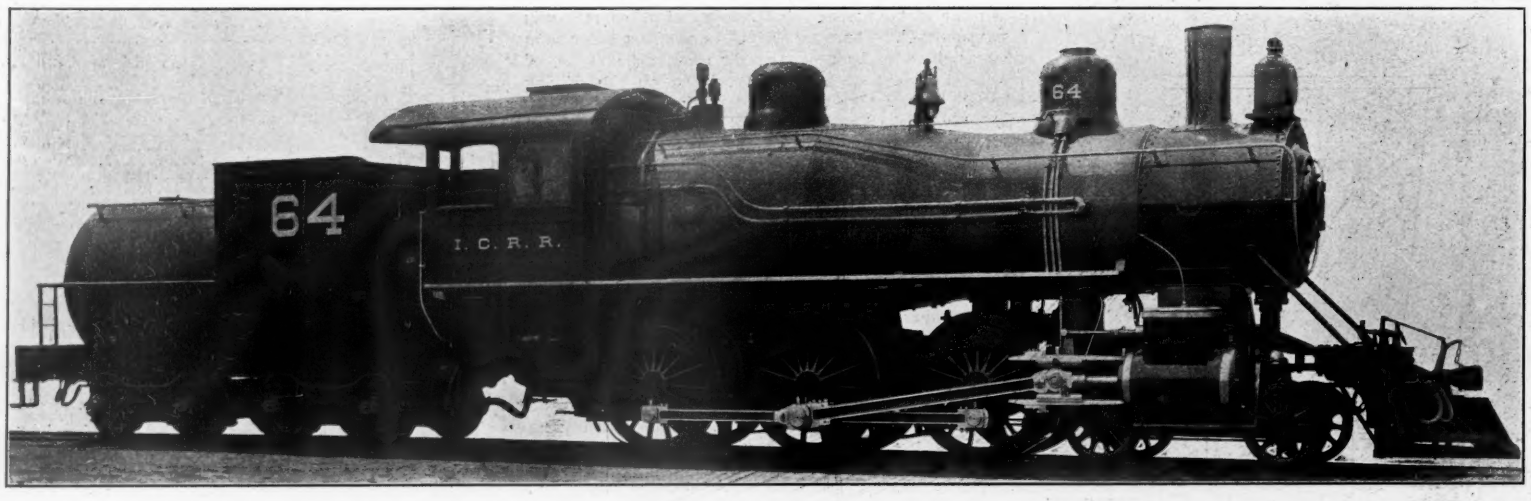
The discussion on this report was short, but it ended in a resolution heartily approving the position taken by the committee and requesting the executive officers of the several roads to see that their traffic departments shall take such action as will cary into effect the recommendations of the committee. The report was recommitted so that the committee could agree upon and report what basis should be used for increasing the rate on bulky goods for cars larger than the standard. This question will, of course, require much conference between the different roads and traffic associations.

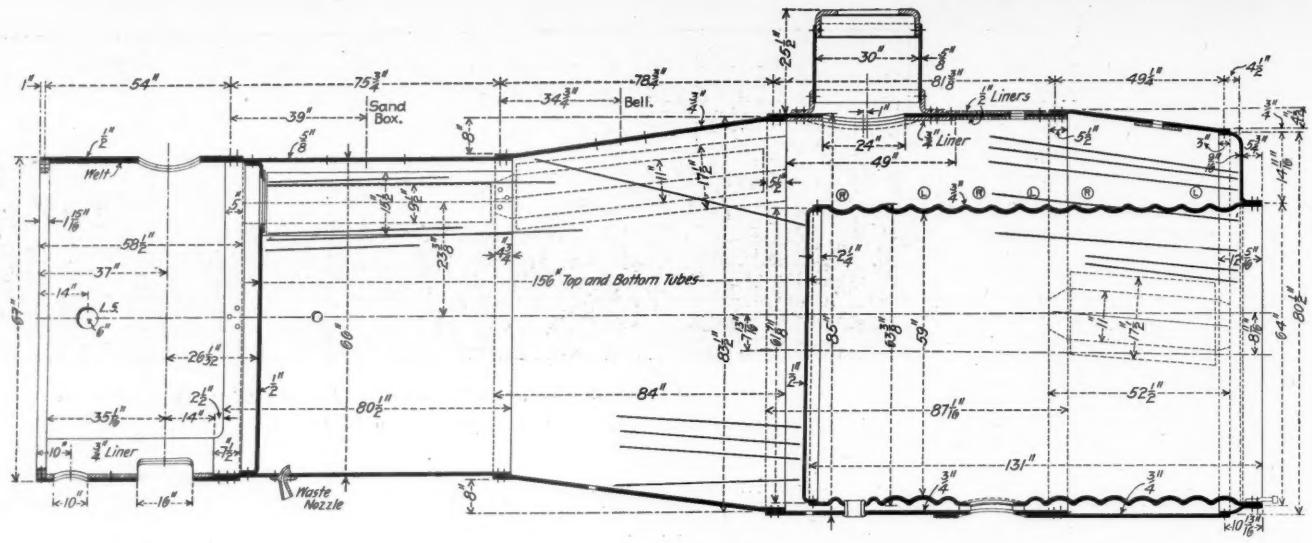
One of the appendices to this issue of the *Proceedings* consists of a report on the International Railway Congress, which was held at Paris last September, and to which a number of delegates went from this Association. This report, filling 15 pages, and signed by President Loree and Secretary Allen, contains an abstract of all the questions which were discussed at the Congress, with the conclusions reached concerning them. The Secretary of the Association, W. F. Allen, 24 Park Place, New York, has a few copies of the full English summary of the Proceedings of the Congress, 306 pages, which can be had at 50 cents a copy.

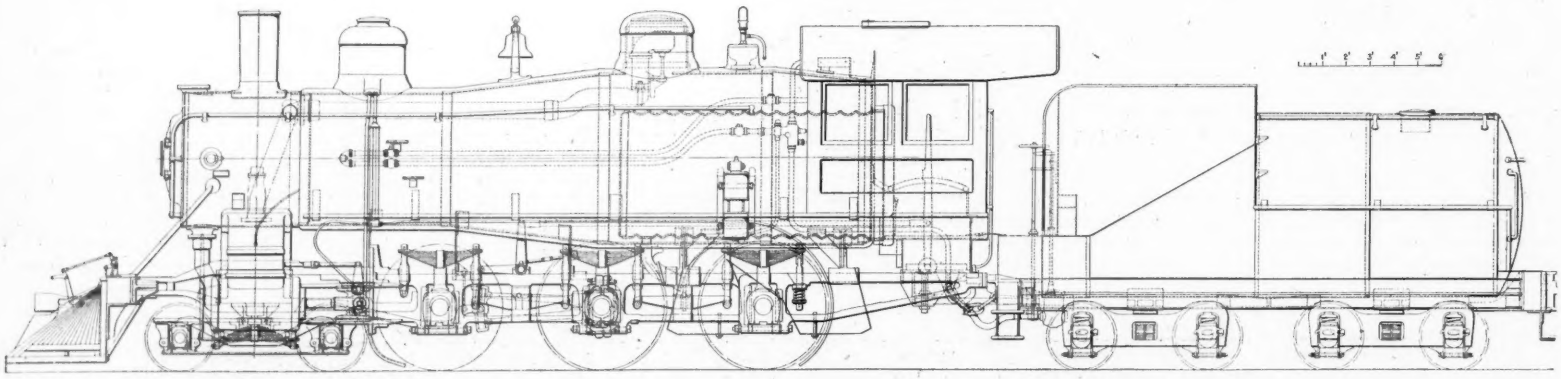
Another appendix contains 10 pages of illustrations, showing revised diagrams of hand, flag, lamp and train signals.

Vanderbilt Locomotive and Tender—Illinois Central Railroad.

In reviewing the record of locomotives with Vanderbilt boilers we referred, in the *Railroad Gazette* May 10, to a 10-wheel freight locomotive recently built by the Baldwin Locomotive Works for the Illinois Central. This engine



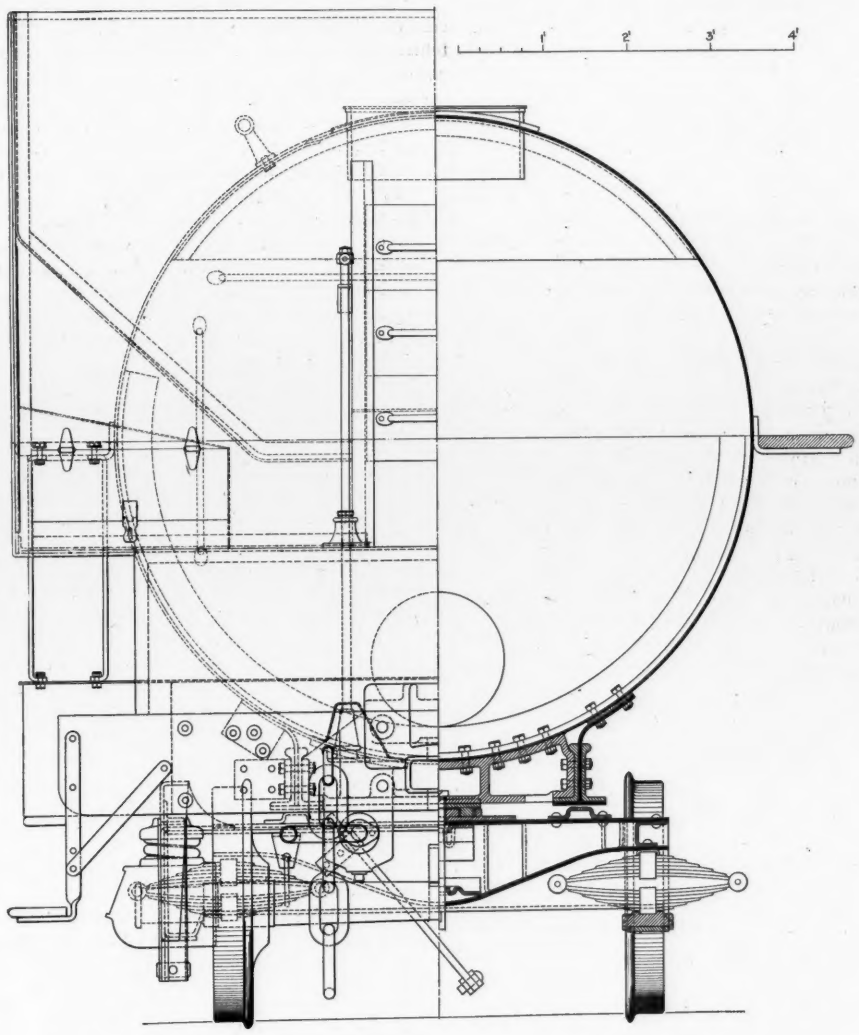




Vanderbilt-Baldwin Ten-Wheel Freight Locomotive—Illinois Central Railroad.

The engine has cylinders 20 x 28 in. and carries a working steam pressure of 180 lbs. per sq. in. The boiler is the extended wagon top type with a straight first course in the barrel, 66 in. in diam. The corrugated tube of the fire-box is, like those which preceded it in engines equipped with this boiler, 59 in. clear diam. inside and 63¾ in. extreme diameter over corrugations outside. The length of the fire-box is 7 ft. 10 in., including the combustion chamber, and the width at the grate line is 57 in., is now at the Pan-American Exposition in Buffalo and, aside from the interest that has been shown in the boiler, has attracted much attention because of the radical departure from ordinary practice which is shown in its tender design. The tender of this engine, No. 64, of the Illinois Central road series, is original with Mr. Cornelius Vanderbilt and is patented. The design of the engine, its boiler, and the tender are shown in the accompanying illustrations.

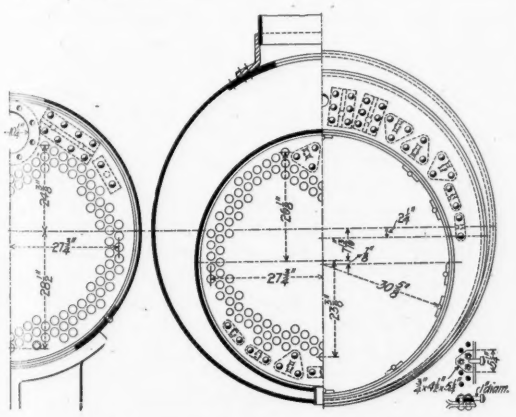
giving a grate area of 33 sq. ft. There are 350 2-in. tubes 13 ft. long, having 2,362.5 sq. ft. of heating surface, which with 135 sq. ft. in the fire-box gives a total of 2,497.5 sq. ft. The weight on drivers is 137,040 lbs. and the weight on engine truck wheels is 30,840 lbs., making a total weight of 167,880 lbs. for engine in working order. The tender loaded weighs about 118,000 lbs. and has a capacity for 5,000 gals. of water and 12 tons of soft coal. The driving wheels are 63 in. in diam. and have cast steel centers. The truck wheels are 33 in. in diam. and have journals 5½ in. x 12 in. The driving axle journals



Half Elevation. *Half Section.*

The Vanderbilt Locomotive Tender.

are 8½ in. x 10 in. and the main crank pin is 6¼ in. in diam. x 6½ in. long. Other information covering the outline specifications for this engine will be found included in the tabulated matter which appears herewith. From the foregoing and the illustration of the boiler, which is here given, minor differences in construction of this boiler and those which have preceded it will be apparent to our readers.



Vanderbilt-Baldwin Boiler Sections.

The tender has a cylindrical tank, the plates of which are of steel ⅜ in. thick. The diameter of the tank is 90 in., which is maintained in full until the back end of the coal hopper is reached. At that point the tank shell is cut on a downward slant, as shown in the drawing, until at the forward end of the water space it is continued 23¾ in. in a straight horizontal line at the top, and forming a segment of the depth shown in the general elevation. The advantage of the cylindrical water tank is at once apparent as it not only economizes the space used for a given quantity of water, but does away with much of the structural material ordinarily used in frames and bracing, the cylindrical form acting largely as a self-supporting beam to sustain the tender load. The saving in dead weight over the ordinary tender is about 15 per cent. The length of tank is 19 ft. 1¼ in., not including the swell of the rear head of the tank.

The cylindrical portion of the tank has two 6-in. T-irons running half way round it on the inside at the bottom, and two 2-in. angle irons running part way around it on the inside at the top. To these members, which serve to stiffen the cylinder of the tank, there are dash plates fastened which prevent the too violent surging of water in the tank and also add to the rigidity of the whole structure. A similar arrangement of angles and T-irons is made in the forward part of the tank and one of the 6-in. T-irons is placed just over each of the two cast steel body bolsters of the tender. It is evident that this arrangement gives greater strength to the shell and insures its permanent cylindrical form.

The coal hopper is rectangular in cross-section and extends out beyond the circumference of the tank, as shown in the cross-sectional view. The sloping bottom of the hopper is pitched as there shown, and gives a constant movement of coal to the pit by gravity from all points in the hopper. The front of the coal space is closed by a steel plate which is cut out to accommodate the coal gates. The gates slide vertically in this plate in three sections. The hand holds of the coal gates also serve as steps for climbing to the top of the tender. The steel plate is also cut out to receive two tool boxes, one at either side of the coal gates and resting on the floor level.

The tender frame is of two longitudinal members bound together by two cast steel body bolsters and the end sills. It is further braced between the body bolsters by two plates connecting the sills diagonally. The bolsters are segmental or concave on their upper surface to conform to the cylindrical body of the tank, to which they are bolted as shown. The sills are made of two 8-in. bulb angles between which is bolted a steel plate ½ in. thick, projecting upward and flanged to conform to the tank body. These plates extend the full length of the tank and are bolted to it, as shown in the half sectional view. Fox pressed steel trucks are used with rigid bolsters and elliptic and coil springs, used in the manner common to the latest form of this truck. The truck journals are 5 x 9 in. and the distance between centers of journals is 76 in.

Table of General Dimensions.

Description:	
Type	Ten-wheel
Name of operating road	Illinois Central R. R.
Gage	4 ft. 8½ in.
Simple or compound	Single expansion
Kind of fuel to be used	Soft coal
Weight on drivers	137,040 lbs.
Weight on truck wheels	30,840 lbs.
Weight, total	167,880 lbs.
Weight tender loaded	118,000 lbs.
General Dimensions:	
Wheel base, total, of engine	24 ft. 4 in.
Wheel base, driving	13 ft. 6 in.
Wheel base total (engine and tender)	53 ft. 3 in.
Length over all, engine	44 ft. 0 in.
Length over all, total, engine and tender	65 ft. 6 in.
Height, center of boiler above rails	8 ft. 9 in.
Height of stack above rails	14 ft. 11⅛ in.
Heating surface, fire-box	135 sq. ft.
Heating surface, tubes	2,362.5 sq. ft.
Heating surface, total	2,497.5 sq. ft.
Grate area	33 sq. ft.
Wheels and Journals:	
Drivers, number	Six
Drivers, diameter	63 in.
Drivers, material of centers	Cast steel
Truck wheels, diameter	33 in.
Journals, driving axle, size	8½ x 10 in.
Journals, truck axle, size	5½ x 12 in.
Main crank pin, size	6¼ in. diam., 6½ in. long
Cylinders:	
Cylinders, diameter	20 in.
Piston, stroke	28 in.
Piston rod, diameter	4 in.
Kind of piston rod packing	United States
Main rod, length center to center	10 ft. 1 in.
Steam ports, length	20 in.
Steam ports, width	1½ in.
Exhaust ports, length	20 in.
Exhaust ports, width	3 in.
Bridge, width	1½ in.
Valves:	
Valves, kind of	American balanced
Valves, greatest travel	5½ in.
Valves, outside lap	1 in.
Valves, inside clearance	1-16 in.
Valves, lead in full gear	3-32 in.
Valves, lead constant or variable	Variable
Boiler:	
Boiler, type of	Vanderbilt
Boiler, working steam pressure	180 lbs.
Boiler, material in barrel	Steel
Boiler thickness of material in barrel	⅝ and ¾ in.
Boiler, diameter of barrel	66 in.
Seams, kind of horizontal	Welded
Seams, kind of circumferential	Double riveted
Thickness of tube sheets	⅝ and ¾ in.
Dome, diameter	31¼ in.
Fire-Box:	
Fire-box, length	7 ft. 10 in.
Grate, width	57 in.
Corrugated tube, extreme outside diam	63⅝ in.
Fire-box, material	Steel
Fire-box, thickness of sheets	¾ in.
Fire-box, brick arch	Yes
Grate, kind of	Shaking finger bars with drop grate
Tubes:	
Tubes, number	350
Tubes, material	Iron
Tubes, outside diameter	2 in.
Tubes, length over sheets	13 ft. 0 in.
Smoke-Box:	
Smoke-box, diameter outside	67 in.
Smoke-box, length	63 in.
Other Parts:	
Exhaust nozzle, single or double	Single, high
Exhaust nozzle, variable or permanent	Permanent
Exhaust nozzle, diameter	5 in., 5⅛ in. and 5¼ in.
Exhaust nozzle, distance of tip below center of boiler	4¼ in.
Netting, wire or plate	Wire, 3½ x 3½; mesh, No. 13
Stack, straight or taper	Taper
Stack, least diameter	18 in.
Stack, greatest diameter	19 in.
Stack, height above smoke-box	3 ft. 4 in.
Tender:	
Type—6-wheel or with swivel trucks	Eight-wheel
Tank capacity for water	5,000 gal.
Coal capacity	12 tons
Kind of material in tank	Cylindrical, steel
Thickness of tank sheets	⅜ in.
Type of under-frame	8-in. bulb angles
Type of truck	Fox pressed steel
Truck with swinging motion or rigid bolster	Rigid
Type of truck spring	Elliptic and coil
Diameter of truck wheels	33 in.
Diameter and length of axle journals	5 x 9
Distance between centers of journals	76 in.
Diameter of wheel fit on axle	6⅝ in.
Diameter of center of axle	5⅝ in.
Type of truck bolster	Fox
Type of truck transom	Fox
Length of tender frame over bumpers	22 ft. 10 in.
Length of tank	19 ft. 1¼ in.
Diameter of tank	90 in.
Type of back drawhead	M. C. B. coupler
With or without water scoop	Without

Periodical Resawing of Rail Ends.*

The difficulty of establishing and keeping up good joints is one of the most serious in maintenance of way, but a recent experiment has led us to think that the periodical re-sawing of the ends of rails will settle this difficulty temporarily and in an indirect way while we wait for the coming of the satisfactory rail joint.

In 1898 the Western Railroad Company had at its disposal a large number of steel rails taken out of track before they were worn out and it was desired to use these again in a secondary line. The ends were much worn and deformed and we were authorized to cut them all off 14 in., drilling new holes for the splice bolts.

We first used revolving hand saws, but afterwards used simple little hand saws, each one of which cost five francs. Each blade cost 0.9 franc and lasted on an average for two cuts. The total cost was 2.10 francs for cutting the two ends of one rail. To this must be added 1.2 francs for drilling four bolt holes.

Assuming rails 18 meters long and assuming that they were re-sawed at the end of 15 years the cost per running meter of track would be very small. The cost for re-sawing, not including administrative cost, would be $\frac{3.30 \times 2}{18} = 0.37$ francs per meter [say 6¾ cents per yard]. No doubt this cost would be considerably reduced if the operation was carried out in a large way. Thus one could lay new rails on a dozen kilometers, re-saw at some neighboring station the rails taken up, then lay these in the section adjoining that one from which they were taken up, and so on in succession, section by section. In working on this scale one would no doubt use a portable mechanical plant for sawing. Incidentally, it is interesting to note that the use of these little hand saws is general on the Western Railroad system for cutting rails whenever occasion arises to do so.

*By M. Bauchal, Assistant Engineer Maintenance of Way, French Western Railroad. Translated from the Revue Générale des Chemins de Fer, April, 1901.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Last Sunday the Broadway cars in New York city were changed from cable to electric working. As is doubtless well known, all of the underground work had been done some months ago, while traffic was continued. Therefore, when the actual change of motive power took place it was necessary to interrupt traffic but a few hours. The whole operation was carried on with a speed and smoothness which testified to fine organization. The cable cars have now disappeared entirely from New York city and the company will begin to fully realize the economies of electric traction. In the year which ended June 30, 1900, the average operating expenses by cable were 17.76 cents per car mile, and by electric traction 13.16 cents per car mile. In that year more than 10½ million cable car miles were run. Supposing this performance to be maintained for one year at the same rate the economy would be about $500,000. Of course, we do not pretend to say whether the gain to the company will be more or less than this.

A Necessary Element of Perfect Automatic Block Signaling.

One of the final arguments against automatic block signals and in favor of manual signaling is that with the automatic there is no person to report to the superintendent when enginemen disregard a signal. By "final" we mean one of the arguments which those putting them forward regard as unanswerable. For several years this has seemed to be, in some cases, the only reason why manual blocking was not abandoned and automatic introduced in its place. The use of automatic signals is now increasing so fast that we may probably assume, with confidence, that this argument has been practically given up as not worth while, or that it soon will be; but a word may be said on the subject notwithstanding.

The advocate of automatic signals must answer this point either by providing the necessary watchman or by asserting that watching is unnecessary. Probably the most common answer—a tacit answer; nobody feels bound to formally defend himself when he buys automatic signals—has been that enginemen could be fully trusted to obey the signals. As continued use of automatic signals has led increasingly to the use of permissive blocking—that is, to the adoption of a rule permitting trains to avoid detention at an adverse signal by proceeding, without stop, under control, to the next signal—the idea of trusting to the judgment of the runners has, of course, become more prominent and has, no doubt, come to have increased force. The judgment of the engineman must, of necessity, be relied upon to a large extent; why draw a line to divide things that he cannot be trusted to do from those with which he can be trusted?

We draw attention to this subject now merely to make record of the fact that this is not the only solution of this question. A wideawake superintendent in the west who has a large number of automatic signals sends out inspectors frequently to test the vigilance of the enginemen. The inspector sets an automatic signal against a train (when the block is clear) and then observes whether the engineman shows any disposition to ignore the indication. The rule requires trains to come to a full stop and wait sixty seconds, and an engineman who decides that he can "use his own judgment" to the extent of stretching the rule, very soon hears from the superintendent, and learns that he must do exactly as the rule says.

We give prominence to this detail of management—a detail so simple that some may be inclined to look upon it as a trifle—because we have found so many superintendents who feel the need of such a means of discipline and so very few who have actually adopted anything of the kind in a systematic manner.

Automatic block signals now perform a function of the highest importance on many hundred miles of track. They are depended upon, absolutely, to protect our fastest trains from collision, and therefore it is necessary not only that the apparatus itself be of the most perfect construction and the care of it in competent hands, but also that the signals be used in accordance with the best possible regulations for prevention of human error. It is true that we still instruct our trainmen to protect by flag when unexpectedly stopped; but, as every one knows, this protection cannot be depended upon. In many cases trains are run so close together that a flagman could not stop a following train if he would; while in many others we must assume that he would not go back with the flag if he could. It is becoming more and more evident with every added year of experience that brakemen fully understand what protection the block signals afford, and consequently relax their own efforts in that direction.

In saying that block signals should be treated as the sole protection from rear collisions and that trying to depend partly on the flagman is a dangerous attempt to sit on two stools we are simply putting in words what is evident every day in experience. Moreover, the experience of English railroads, covering twice or three times as many years as ours, is constantly before us. They still maintain the flagging rule the same as we do, though they use the block system everywhere; but the Board of Trade inspectors, the most accomplished fault-finders in the world, never censure a guard for not obeying that rule.

Only the simplest logic is required to justify the postulate that the best practicable means should be employed to prevent errors or neglect on the part of enginemen. We spend money very liberally to insure perfect action of the signals; why not put forth equal energy to insure perfect reading of the signals? Superintendents of roads where manual blocking is employed say that the enginemen make more errors (resulting in collisions) than do the signalmen. If this is so we may perhaps assume that enginemen will make more errors than will a well-designed and well-cared-for mechanical or electrical device. Certainly the record of errors on the part of our inanimate signalmen which have performed the millions of automatic block signaling operations in America which have made up our record for the past fifteen years, has been a highly creditable one, so far as results are concerned. If any automatic signal has caused a collision, the resulting loss of life, limb and property has been so small that the public has never heard of it.

Whether the errors of enginemen be many or few, some idea of their frequency or the frequency of conditions which tend to produce them is a necessary part of what the superintendent should know in order to be fully posted on how his road is being worked. The personal equation is an element in discipline which it is often said cannot be measured, but it is the duty of the disciplinarian to measure it as well as he can. With an attendant at every signal we say that we are setting a watch on every act of every engineman (so far as block signaling is concerned). Very well; but in abolishing signalmen we do not need to go to the other extreme and have no watch at all on any of the enginemen's acts. We are not thus radical in money matters. The traveling auditor cannot visit a station agent every week, or even every month; but his practice is such that an occasional visit is in many respects as useful as regular and frequent visits would be. The watching of passenger conductors, to check slipshod practices and to detect the occasional thief, cannot be carried on all the time, the cost would be too great. But occasional watching is found very useful; its good effects are not confined to the few days or weeks in which the watchmen are at work.

Why not take as good care to prevent misconduct on the part of enginemen, whose wrongdoing will cause collisions and death and damage a railroad's reputation, as to prevent these other kinds of misconduct which involve nothing worse for the company than a small loss of money?

We do not need to tell the conscientious superintendent of a busy railroad that his peace of mind necessarily depends, day and night, on the degree of confidence which he feels in the competency for their duties of the scores or hundreds of engineers and other men whom he intrusts with the actual work of running the trains. We merely wish to call his attention to the fact anew. Any such superintendent who has not tried the expedient that we have mentioned or who has tried it but little, will, we are sure, by following the example of our Western friend, furnish himself with definite knowledge concerning the habits of his enginemen where now he has only indefinite knowledge. Knowledge gained by judicious tests, made every few weeks, furnishes a *positive* basis of confidence in the efficiency and reliability of your enginemen; while to trust an engineman because he has not had a collision is not knowledge at all; you have merely a negative ground for trusting him.

The World's Railroads.

We publish elsewhere tables showing the mileage of the railroads of the world, with the area and population of each country, per mile of railroad, compiled and reduced from the tables published yearly in the *Archiv für Eisenbahnwesen*, an official publication of the Prussian Ministry of Public Works. The mileage in our table is for the year 1899, but the *Archiv* gives the figures for each of the four previous years, and a large part of the interest of these statistics lies in its showing of yearly extension of railroads in the different countries and quarters of the globe.

The aggregate length of railroads in the world in 1899 is shown by these statistics to have been 479,900 miles, distributed among the several continents, as follows:

Europe	172,622	North America	216,290
Asia	35,938	South America	27,874
Africa	12,501	Australasia	14,675

The old continents have 221,061 miles; the new ones, 258,839.

The increase in the world's mileage since 1895 has been 44,574 miles, or a little more than 10 per cent. The increase on the several continents has been:

	Increase in			
	1895.	1896.	1897.	1898.
Europe	3,803	3,520	4,065	4,975
Asia	1,973	1,993	2,392	2,620
Africa	1,044	632	1,311	1,342
Australasia	14	484	134	175
North America	1,490	3,148	2,179	3,268
South America	1,472	970	785	786
The world	9,796	10,747	10,866	13,166

To one who has long followed the course of railroad construction, what is most notable here, is the lead taken in Europe and Asia, which had long been held by North America. The percentage of increase for the four years was 10½ per cent. in Europe, 33 1-3 in Asia and less than 5 per cent. in North America. The reason for this becomes plain on examining the population per mile of railroad—2,208 in Europe, 28,600 in Asia, and 437 in North America. But the contrast between recent years and earlier periods is striking. Europe built more railroads in this four-year period since 1895 than in any other since 1879, at least; America less than in any such period from 1879 to 1894, during which 16 years more than half of all the increase in mileage in the world was every year in this continent. In the four years ending with 1883 there were built in the United States 35,000 miles of railroad; in all the rest of the world 22,270 miles; again, in the four years to 1899 32,429 miles were opened in the United States, against 35,466 in all the rest of the world, 15,291 of which were in Europe. To drop from these tremendous figures to the 7,548 miles opened in this country in the four years to 1899, when 16,363 miles were built in Europe, and 8,978 in Asia even, is a fact of tremendous economical significance. Heretofore every return of a period of prosperity in this country has been accompanied by great expenditures of capital on new railroads—railroad building for the time has been almost the chief industry of the country, and has certainly absorbed more capital than all the other industrial enterprises set on foot at the same time. The difference between the cost of the 35,000 miles opened in the four years to 1883 and that of the 7,548 miles opened in the four years to 1899 is an enormous sum, and it has been so much addition to the amount available for increasing production. Heretofore there has been a great overproduction of the means of transportation in every period of prosperity, which has lessened the country's ability to extend the production by which

the carriers must be supported. We have spent so much money for horses to carry our crops to market that we have not had enough to clear, fence and cultivate the land which must grow the crops for the horses to haul. It is, therefore, most encouraging that in these recent and present prosperous years there has been no such great increase in railroad construction as characterized the periods immediately following 1866, 1878, and 1884. It is well for the railroads, and it is well for the productive industries.

Doubtless, however, the decrease in railroad building in this country is exaggerated by the above figures, because it is of late years that there has been the greatest activity in building street railroads, and very much more of this has been done here than in any other country.

Returning now to the data showing the proportion of railroad mileage to population and area in the different countries, we see that it is the comparatively new countries, or, more definitely, the United States and the English colonies in America and Australia, which have the greatest mileage in proportion to population. All Australia has only 311 inhabitants per mile of railroad, Canada 304, the United States 392. The only other country approximating these figures is the Argentine Republic. All these countries have most of their area distant from the sea; all were until recently unpeopeled, and to utilize quickly the natural resources at all, it was necessary to give them an outlet to the old world. This old world, however, having been developed before the days of railroads, has, necessarily, had a parallel growth, side by side, of population and industries; and this is why Europe is sufficiently served by a mile of railroad to 2,208 people, while Canada requires a mile for 304.

Comparisons of the United States as a whole with any one European country are of less value than comparison of European countries with each other; because this country is of such vast extent, nearly as large as all Europe, with about one-fifth of its population; and because of the very different degrees of development of different parts of the country. By the help of the territorial "groups" of railroads, as described in the Interstate Commerce Commission reports, we shall be able to make more significant comparisons.

The European country with the most railroad in proportion to area is Belgium, where the railroad system, if laid in parallel lines across the whole country would make the lines less than three miles apart (2.96 miles). Belgium has an area of 11,373 square miles. New Jersey, with 7,815 square miles, has 3.33 square miles per mile of railroad; Massachusetts 3.78 square miles; Pennsylvania, somewhat similar to Belgium in industries, but four times as large, 4.42 square miles.

Belgium is one of the smallest of countries, however. Doubtless an equal area might be selected in England, adjacent to Philadelphia, and perhaps adjacent to Chicago, where there is more railroad than in Belgium.

Great Britain and Ireland have together an area of 121,175 square miles; the territory included in Group II. of the Interstate Commission (the Middle States as far as the Potomac) has 116,530 square miles. Group II. has 21,143 miles of railroad; Great Britain and Ireland, 21,167—nearly alike in area and railroad mileage. But the new census shows 42,281,000 people in Great Britain and Ireland, against 17,107,000 in the territory of Group II.—1,951 per mile of road there, 809 here.

Still more nearly equal to the British territory is that occupied by our "Group III." of railroads—Ohio, Indiana and the lower peninsula of Michigan, which have in the aggregate 120,260 square miles; but they have 23,316 miles of railroad and only 8,859,000 inhabitants; per mile of railroad 5.2 square miles and 380 people, against 5.65 square miles and 1,951 people in the British Kingdom.

France has 7.8 square miles of territory and 1,477 people per mile of railroad and a total area of 207,107 square miles. Compare this with the combined territories of Groups II. and III., west of New England and east of Indiana and Lake Michigan, which have 236,790 square miles, 25,966,000 people and 44,459 miles of railroad—5.3 square miles and 584 people per mile of railroad. The German Empire has nearly the same area as France—208,700 square miles, and we therefore compare the above figures of combined Groups II. and III. with its 31,392 miles of railroad and its 6.68 square miles of area and 1,661 people per mile of railroad.

The other European countries are less well provided with railroads, but there is a smaller population per mile of road in some of them—1,300 in Switzerland, 1,309 in Denmark, and 752 in Sweden—all much greater than the average in this country and most nearly comparable with the 739 in New England and the 809 in Group II.

A general conclusion of these comparisons is that in a large part of this country the railroad system is substantially complete, so far as mileage is concerned. The great work of construction remaining to be done is the perfection of the existing lines, which goes on constantly, but rapidly only in prosperous times.

As examples of the requirements made on the Minister responsible for a state railroad system, we cite two "interpolations" by delegates at one sitting of the Prussian Parliament in April. "Is the government ready to introduce without delay greatly reduced freight rates on seed wheat and grain for bread for those districts where winter grain has been entirely or in great part winter-killed?" An important part of the wheat and some rye was winter-killed this year in Prussia. Again (by city delegates), "since Feb. 6, 1901, in various districts of Prussia there has been a special freight rate for straw and other forage, from the benefits of which dealers in forage, unless they belong to farmers' associations, are excluded. What measures does the government contemplate to put an end to this violation of the laws governing railroad traffic?" Explanatory of this latter, it may be assumed that forage was so short last season that many farmers had not enough to keep their own stock, and that for their benefit they wanted a reduction in rates, which was opposed by those among them who had forage to sell, if it would facilitate the supply of the towns with forage, and reduce its cost to others than their fellow-farmers. By giving the reduction only to the members of the Prussian equivalent of "the Grange," this difficulty could be avoided. We are not expert enough in Prussian law to say whether this violates its provisions concerning equal rates for all. The Prussian "grangers" are very different people from the American variety, but they show in every session of Parliament that they can "hold up" the government, Emperor and all, if they do not get what they want.

Roumania, in 1899, had 1,914 miles of railroad, on which the traffic during that year was equivalent to the movement of 181 passengers and 255 tons of freight each way daily. This passenger movement is heavier than in any of the "groups" of the Interstate Commerce Commission, except New England and the Middle States, where it is equivalent to 332 and 260 respectively, and more than 50 per cent. greater than in "Group III." (Ohio, Indiana and the lower Peninsula of Michigan), where it was 116; in considering which remember that Group III. has 361 inhabitants to a mile of railroad; Roumania, 2,632. The freight movement in Roumania, however, is not one-fifth as great as in Group III., and is greatly exceeded in the districts with lightest traffic in this country. The gross earnings of the Roumanian roads were $3,022 per mile, 82 per cent. of which was absorbed by the working expenses, leaving net but $544 per mile. Grain is the freight which yields largest earnings, followed by lumber.

NEW PUBLICATIONS.

Iron Corrosion; Anti-Fouling and Anti-Corrosive Paints. By Louis Edgar Andrés. Translated from the German. 2¾ x 5¾ in., pp. viii + 275, 62 illustrations. London: Scott, Greenwood & Co. 1900. (D. Van Nostrand Co., New York.) $4 net.

This book seems the most valuable work that has yet appeared on the subject of painting iron work. Its treatment is practical, free from chemical formulas, and from the standpoint of use rather than of manufacture. Anti-corrosive paints form the main subject, only about 20 pages being devoted to anti-fouling compounds.

Over 50 pages are given to the nature and causes of rust, Spenrath's essay being liberally quoted. Twelve pages are given to the proper condition of the iron surface for the application of paint, the conditions being briefly that it shall be free from rust and from adherent acid and perfectly dry.

About 15 pages are given to the choice of the first or "priming" coat. Iron-oxide and linseed oil are treated, and much is said of the use of red lead. The author does not approve of red lead as a priming coat, says iron-oxide is unobjectionable, but that the best material for a first coat is a very thin coat of linseed varnish applied hot. By linseed varnish he appears to mean simply boiled linseed oil. He says that the sole protection afforded by paint is due to the properties of the oil or varnish, and to the use of a pigment inert to the same.

Ten pages are then devoted to the choice of the finishing coats, white lead, red lead and iron-oxide being especially considered. He states "the most suitable paint for the preservation of iron structures will be the one that contains a pigment requiring a large admixture of linseed oil or linseed varnish in order to render it distributable, and which exerts no influence, favorable or the reverse, on the drying and hardening of same."

The application of paint is next taken up. The author's conclusions are "lay the paint on as thinly as possible, consistent with covering the object"—"each previous coat of paint must be perfectly dry before the following coat is laid on"—and "the subsequent layers must be equally protected from water and rain."

About eight pages are given to the number of coats and as many more to the testing of paints by immersion in water and to signs which indicate the necessity of repainting. It is stated that "one bottom coat and three subsequent coats, laid on at suitable intervals," will be the minimum number required for protection," and that "repainting is an urgent necessity—if the paint exhibits cracks, be they ever so fine; if it has become dull and crumbling so that the pigment can be wiped off in the form of powder by the hand or with a cloth," or "if rusted places or yellowish red patches show themselves in the paint."

The absurdity of the claims to impossible properties sometimes made by paint manufacturers is exposed, and the conditions essential to the attainment of a durable paint coating are stated. A description is given of the component materials of paints, linseed varnish occupying nearly 30 pages and pigments over 20. Lead, zinc, iron-oxide and graphite pigments are treated. The author seems to approve of all zinc pigments, of all native oxides of iron, and of graphite—but to disapprove of red lead.

Next in order are taken up the influence of the proportion of oil on the durability of the paint, the preparation or manufacture of paints, and the results of the examination into the constituents of 13 paints. All other compositions and processes, not included in the oil paints, are then treated. The book closes with a presentation of the Swiss official methods of testing the utility of paints, and with some European official specifications for painting. The last page contains the author's recommendations for painting iron work.

The subject is so thoroughly and excellently covered that no important adverse criticism of the book can be made. The authorities and tests quoted are mainly European, as is natural. In quoting the American examinations of E. Gerber, his name is incorrectly given as M. G. Huber. American conditions and tendencies would seem to require that more space should be devoted to electrolysis, and that the use of the sand blast should be at least mentioned.

The book is not divided into chapters, which seems unnatural to American readers. Sub-titles are used instead, to which, however, the subject-matter does not conform so closely as it might, but the index seems as full as is necessary. The book is unapproached in scope and value by any previous publication on the painting of iron work, and will be of great value to all interested in the subject.

TRADE CATALOGUES.

Electric Instruments.—The Stanley Electric Mfg. Co., Pittsfield, Mass., have just issued their Bulletin No. 117 describing the S. K. C. indicating wattmeter and the S. K. C. phase indicator. The spherical coil wattmeter is made upon the dynamometer principle and a description of its arrangement in detail is given in the Bulletin. It is available and efficient for direct current work. Conditions and requirements under various loads and locations are discussed, with instructions for auxiliary equipment of the instrument. A feature of these instruments is that they have practically the same case and base as the well-known type of S. K. C. hot-wire ammeters and voltmeters; that is, a rubber base-plate set in a brass rim, rubber cylinder for the side, spun brass cap and bevelled plate glass front. They are insulated for high potentials and may be used with 10,000 volts between the case and working parts without danger. A portable type of indicating wattmeter will presently be brought out. The S. K. C. phase indicator is a modified spherical coil wattmeter having its zero in the center. Two arrows, pointing to the right and left respectively, take the place of the wattmeter scale. The instrument depends for its action upon the principle that no force is exerted between two coils carrying currents 90 deg. apart. The indicator gives correctly at a glance the condition of the phase relation of current and E. M. F. on a circuit. The pointer deflects to the left if the current lags behind the E. M. F.; remains at zero when the current is in phase; and deflects to the right if the current leads the E. M. F. Where motors are run from the same generators that are carrying an electric lighting load such an instrument is of great value as the point of proper excitation of the synchronous motors is quickly and exactly determined, and thus the regulation of the whole system is materially improved.

The Erie Railroad issues a handsome folder designed to call attention to the Erie as a route by which to reach Buffalo and Niagara Falls. It is pointed out that this road also reaches directly another very attractive spot, namely, Chautauqua Lake, and in fact is the only line reaching all three of these points direct. The folder contains illustrations and descriptions of the Exposition grounds and buildings with an elaborate colored plan of the grounds. There is also information about Niagara Falls and Chautauqua.

Hydraulic Benders.—The Watson-Stillman Co., 204-210 East 43d street, New York city (The Rookery, Chicago), has issued a catalogue, being No. 59, designed especially to show a line of hydraulic bending tools. This includes rail benders of various sorts for T rails and girder rails, pipe benders, straightening presses, beam-bending presses, a crank pin press and various small parts for these and other tools.

Styles' Power Punching Presses; Bliss Straight Sided Power Presses.—These are pamphlets No. 2 and No. 3, issued by E. W. Bliss Company, Brooklyn, N. Y. The scope of the pamphlets is sufficiently indicated by the title. They contain illustrations, with descriptions, of presses of various types and capacities.

TECHNICAL.

Manufacturing and Business.

The Handlan-Buck Mfg. Co., St. Louis, Mo., has acquired all the assets of the M. M. Buck Mfg. Co., and will hereafter conduct the business formerly carried on by the old concern.

J. C. Halladay, formerly Western representative of the Pickering Spring Co., has been appointed General Western Sales Agent of the Protectus Co., with offices in The Rookery, Chicago.

The new plant of the Wilmington Railway Spring & Mfg. Co. at Washington, Pa., was designed by Wm. B. Scaife & Sons, Pittsburgh, Pa., who will also make and put up the buildings. They will be of steel frame construction with slate roofs and corrugated iron sides.

Shanahan, Woolfolk & Co., of South Framingham, Mass., who recently secured a large contract from the Metropolitan Water Board of Boston for an aqueduct, have placed an order for an air compressing plant with the McKiernan Drill Co., of New York, to the amount of $25,000.

G. E. Macklin, who was General Sales Agent of the Pressed Steel Car Co. of Pittsburgh, with headquarters in New York, has recently been made General Manager of the company, vice H. G. Shellenberger, resigned. E. E. Forgens, formerly with the Chicago Lumber Co., has been appointed Purchasing Agent of the Pressed Steel Car Co.

American all steel couplers will be used on 200 cars being built for the New Orleans & North Eastern, and on 300 box cars being built by the Georgia Railroad at its own shops. Thornburgh tandem draft rigging attachments will be used on the Georgia Railroad cars as well as Keystone body and truck bolsters, which will also be used on 300 box cars recently ordered by the Chesapeake & Ohio.

Iron and Steel.

Gilbert H. McCauley, General Manager of the Central Iron Works, Harrisburg, Pa., died suddenly in that city May 25, aged 60.

The directors of the Cambria Steel Co., on May 22, decided to increase the capital stock from $4,320,000 to $50,000,000, $45,000,000 of which is to be issued.

A contract for about 200 miles of rails will be let about July 1 by the Oklahoma Central & South Eastern Ry. Edmund Frunty, President, Enid, Okla. T.

Charles H. Ashburner, aged 74, and at one time President of the Abbott Iron Co., and later Treasurer of the Pottstown Iron Co., from which office he resigned three years ago, died in Baltimore, Md., May 22.

The stockholders of the Diamond State Steel Co. will meet in about two weeks in Wilmington, Del., to vote on dissolution as part of the proceedings to transfer the Diamond State Steel Co. to the new corporation of the same name.

The Fort Pitt Forging Co. has been incorporated in Pennsylvania, with a capital of $10,000, to make specialties in iron and steel. The incorporators are: Thomas W. Smith, Wm. G. Coston, Jesse Lazear, J. Bruce Orr and Thomas C. Lazear, all of Pittsburgh.

The Columbian Iron Works, Baltimore, Md., will be sold at auction on June 12. Wm. F. Frick and H. R. Preston are the commissioners to conduct the sale. It is stated the Baltimore Ship Building & Dry Dock Company is being organized to buy the property.

J. K. P. Miller, Chief Engineer of the H. C. Frick Coke Co., has resigned to become Chief Engineer and General Manager of the J. W. Ellsworth Co., which operates extensive mines in the Monongahela Valley. The change is effective June 1. Mr. Miller has been Chief Engineer of the Frick Co. since 1892.

The Tula Iron & Steel Works & Manufacturing Co. was incorporated in New Jersey, May 21, with a capital stock of $2,500,000, by M. R. & B. F. Burnham, of Erterreria de Tula, Mexico; E. L. Imhaff, of Pittsburgh, Pa.; Robert L. Lawrence and Francis McGee, of Jersey City, N. J.

Among recent contracts taken by the American Bridge Co. are: A cantilever bridge over the Colorado River for the Atchison, Topeka & Santa Fe; two deck plate girder spans for the Nacozari R. R. of Mexico; also the steel work for the Rogers Hotel, Seventh avenue and Twenty-fifth street, New York City, and 8,000 tons of steel channels and beams for work on the grade crossings on the New York Central & Hudson River at Buffalo.

American Locomotive Company.

It is officially announced that no statement relative to the plans and purposes of the new American Locomotive Company will be given out before June 15, on which date the titles, etc., of the underlying plants will be transferred to the company.

White Locomotive Co. Formed.

The White Locomotive Works, with a capital of $200,000, has been incorporated in New Jersey by incorporators Charles W. Morrison, Robert L. Welterbeck and Walton B. Seldur, who give their address as No. 76 Montgomery street, Jersey City. The company, so the charter states, will make locomotives.

Jackson & Sharp Co. Bought by the American Car & Foundry Co.

The American Car & Foundry Company, of St. Louis, has bought the entire plant, good-will and existing contracts of the Jackson & Sharp Company, of Wilmington, Del. The new owners intend to continue the business of the Jackson & Sharp Company along the same lines as heretofore. The plant will be known as the Jackson & Sharp plant of the American Car & Foundry Company.

The Hyde Park Locomotive Works.

The Engineer (London) of May 17 has a long description of the Hyde Park Locomotive Works in Glasgow. This is the largest locomotive works in Europe, and one of the oldest in Great Britain. The annual capacity now is 300 main-line locomotives, and the firm employs 3,500 hands exclusively in building locomotives. The electric power plant aggregates 2,700 h.-p., and the main shafting is driven by ten 75 h.-p. motors. Naturally, the installation of hydraulic power is very complete. This is worked at a pressure of 1,500 lbs. per sq. in. The accumulator has a ram 18 in. in diameter and 20-ft. stroke. There is a 1,200-ton hydraulic forging press and a 200-ton wheel press. For these the pressure is intensified to two tons per sq. in. There is a pneumatic power plant as well.

Production of Open Hearth Steel in the United States.

The production of open-hearth steel in the United States in 1900 was 3,402,552 gross tons, against 2,947,316 tons in 1899. The open-hearth steel made in 1900 was produced by 92 works in 17 states. In 1899 the production of open-hearth steel by the basic process amounted to 2,080,426 tons and by the acid process to 866,890 tons. Of the total production in 1900 2,547,023 tons were made by the basic process and 855,529 tons were made by the acid process. The total production of open-hearth direct steel castings in 1900, included above, amounted to 179,326 gross tons, of which 41,094 tons were made by the basic process and 138,232 tons were made by the acid process. In 1900 our open-hearth production probably exceeded that of Great Britain, which amounted to 3,030,251 tons in 1899. Great Britain's production in 1900 has not yet been published.—*The Bulletin.*

Colorado Fuel & Iron Improvements.

J. C. Osgood, President of the Colorado Fuel & Iron Co., says that the improvements in the steel plant, provided for by an issue of $12,000,000 of common stock authorized by the stockholders, Sept. 25, 1899, are nearing completion. The plan provided for the increase of the steel production from 150,000 to 600,000 tons, or fourfold. The company will convert a portion of this increased product into more finished products, such as tinplate, wire, nails, sheets, etc. To carry out these plans an agreement has been made with Blair & Co., of New York, and the Illinois Trust & Savings Bank, of Chicago, to underwrite an issue of $10,000,000 of 5 per cent. convertible debenture bonds of a total issue of $15,000,000. The issue of the initial $10,000,000 of debenture bonds is for building and operation of auxiliary plants. The remaining proceeds of the bonds will be available for future enlargements of the plant. The proceeds of the remaining $5,000,000 of debentures will be used only for the acquisition of additional property.

United States Steel Corporation.

As a result of the acquisition by the U. S. Steel Corporation the directorates of the American Steel Hoop Co., the American Sheet Steel Co., and the American Bridge Co. have been reorganized. The present directors of the American Steel Hoop Co. are: C. M. Schwab, E. H. Gary, D. G. Reid, W. B. Leeds, F. S. Wheeler, Veryl Preston, J. J. Treacy, Hugh Kennedy, J. W. Jenks, Severn P. Kerr and J. M. Bentley. The officers are: President, Veryl Preston; Vice-President and General Sales Agent, Severn P. Kerr; Treasurer, F. S. Wheeler. The headquarters of the company will remain in New York, while the operating department will be in Pittsburgh. Hugh Kennedy is manager of the furnace department, J. W. Jenks general superintendent of the rolling mills and J. M. Bentley the auditor.

The following have been elected directors of the American Sheet Steel Co.: George G. McMurtry, John A. Topping, Wallace P. Bache, C. M. Schwab, E. H. Gary, D. G. Reid, W. B. Leeds, F. S. Wheeler, W. T. Graham, T. M. Day, Jr., and J. Warner. The officers remain unchanged.

The directorate of the American Bridge Company, of New Jersey, has been organized and is now constituted as follows: A. J. Major, August Ziesing, James Christie, Paul L. Wolfel, R. J. Davis, Abram S. Hewitt, C. M. Schwab, E. H. Gary and Percival Roberts, Jr. The officers are: President, A. J. Major; Vice-Presidents, W. H. McCord, J. A. Hatfield and C. C. Schneider; Treasurer, William H. Connell; Secretary, H. Schoonmaker. The board of the American Bridge Co. of New York, a selling company, is composed of J. A. Hatfield, C. C. Schneider, James A. Huston, August Ziesing, J. P. Kennedy, E. A. Muench, A. J. Major, C. W. Bryan, Charles M. Schwab, Percival Roberts, Jr., and S. P. Mitchell. The officers are: President, J. A. Hatfield; Vice-Presidents, August Ziesing and C. C. Schneider; Chief Engineer, S. P. Mitchell; Auditor, C. C. Price; Treasurer, Wm. H. Connell; Secretary, H. Schoonmaker.

The Allis-Chalmers Company.

The prospectus of the Allis-Chalmers Company was issued on May 16 by Vermilye & Company, underwriting managers. The valuation of the several plants included in the consolidation is placed by Julian Kennedy at $9,935,000. No allowance is made for goodwill. The total present value of tangible property is stated at $19,935,000, while the total issue of preferred stock against this property is only $16,250,000. The companies taken over by the Allis-Chalmers Company include the following builders of heavy engines, mining and other machinery: The Edward P. Allis Company, of Milwaukee, Wis.; Fraser & Chalmers (incorporated), of Chicago, Ill.; the Gates Iron Works, of Chicago, Ill., and the Dickson Manufacturing Co., of Scranton, Pa. (exclusive of locomotive works). The examining engineer found that the great bulk of the tools in the plants are comparatively new. It is stated that the Allis, Fraser & Chalmers and Gates Iron Works plants have been operated night and day during the past two years and have, from lack of capacity, declined in that period as much business as they have been able to accept. The profits of the consolidated company for the fiscal year to end of May 1, 1902, are estimated as sufficient to pay dividends at the rate of 7 per cent. on the authorized preferred stock and about 4 per cent. on the common stock. The issued preferred stock bears 7 per cent. cumulative dividends, and it is convertible into common stock, share for share, at the option of the holder, until May 1, 1921. It also has a further preference of 1 per cent., non-cumulative, after the payment of 7 per cent. upon the common stock. The issued amount of common stock is $20,000,000.

The officers of the company are Wm. W. Allis, Chairman of the Board; Charles Allis, President; W. J. Chalmers, Chairman of Executive Committee and Treasurer; William A. Read, Chairman of Finance Committee; Max Pam, General Counsel, and Edwin Reynolds, Chief Engineer.

The Board of Directors is as follows: Edward D. Adams, Elbert H. Gary, William A. Read, James Stillman and Cornelius Vanderbilt, of New York; William L. Elkins, Jr., of Philadelphia; Henry W. Hoyt, W. J. Chalmers, James H. Eckels and Max Pam, of Chicago, and Charles Allis, William W. Allis, Frank G. Bigelow and Edwin Reynolds, of Milwaukee.

THE SCRAP HEAP.

Notes.

E. E. Clark, Grand Chief of the Order of Railway Conductors since 1890, has been re-elected.

The Mayor of Buffalo has appointed a commission to promote the project of a Union passenger station in that city.

Chicago papers say that the Pullman Company is considering a plan for paying pensions to employees retired on account of old age.

A press despatch from Cumberland, Md., of May 22 reported 143 arrests of trespassers on the line of the Baltimore & Ohio between that place and Washington Junction in six days.

The spring change of time-table on the Pennsylvania Railroad went into effect on May 26. The new time-tables sent out from the general passenger office at Philadelphia weighed about five tons.

The Lehigh Valley Railroad, complying with the new law of New York State, has given to each of the New York agents of railroads in the West a certificate authorizing such agents to sell tickets over the Lehigh Valley.

The Michigan Legislature has come to an agreement upon the question of the taxation of railroads, and both houses have passed a bill providing for the taxation of this class of property upon the basis of its "true cash value," as fixed by the State Tax Commissioners, at the average rate paid by other property in the State.

The railroads of East Tennessee and Western North Carolina were badly damaged by floods last week. The Asheville Division of the Southern Railway is said to have been damaged to the extent of several hundred thousand dollars. The line from Asheville to Salisbury was blocked for about a week. Many bridges were carried away.

Justice Gildersleeve, of the New York Supreme Court, in the case of Weil, has decided that the new law against ticket brokerage is unconstitutional. It is usual in cases of this kind for the Supreme Court to assume the constitutionality of a law and leave to the higher court the question of settling the question on its merits, when appealed; but in this case the judge held that the law was so near like the former law, declared unconstitutional, that he could not reasonably assume it to be valid.

San Francisco papers state that President Hays, of the Southern Pacific, has issued an order that no person employed by the road shall be a director or officer of any oil company or be engaged in any outside business. It is said that one of the Superintendents had such large outside interests that, on the issuance of this order, he resigned; and that a man sent by Mr. Hays to investigate the oil fields of Texas made large investments there for himself, to the detriment of the interests of the company.

Since Mr. Felton became President of the Chicago & Alton freight conductors on that road have had the opportunity of competing for a semi-annual cash premium. A Chicago newspaper says that, for the current half year, all the conductors will have to go without the premium, there having been so many collisions that the management has decided that the most suitable discipline will be a total suspension of the premiums for this

term, with the hope of inducing the men to be more careful for the next half year, which begins July 1.

The Pennsylvania has put on a fast train from Harrisburg to Philadelphia, in the morning, running through in 2 hours 37 minutes, and making the time from Harrisburg to New York, 196 miles, 5 hours. The trains between Philadelphia and Buffalo have had their time shortened about one hour. The east-bound Pennsylvania Limited will hereafter connect in Broad Street Station, Philadelphia, with a fast train to Atlantic City. The New York, New Haven & Hartford now has one train running from Hartford to New York, 110 miles, in 2 hours 22 minutes. The Queen & Crescent now runs a train from New Orleans to Cincinnati, 830 miles, in 22 hours 55 minutes. The corresponding south-bound train takes 24 hours. The North Coast Limited of the Northern Pacific now makes the distance between St. Paul and the Pacific Coast, 1,912 miles, in 71 hours.

Traffic Notes.

The Traffic Manager of the Southern Pacific announces that full trainloads of California fruit will this year be taken to Chicago in six days and to New York in nine days, much quicker time than has been made heretofore.

The passenger rate war from Kansas City eastward has been temporarily settled, the principal contestants, the Alton and the Wabash, having agreed to submit the question of differential rates to arbitration. Tariff rates will be restored on June 7.

The Great Northern is now hauling logs from Cass Lake, Minn., to Sauk Rapids, 190 miles. A contract has been made to haul about 15,000,000 ft. Usually the shipments amount to one train of 20 cars daily, carrying about 120,000 ft. of logs.

The Presidents of the railroads west of Chicago appear to have concluded that a conference on the subject of rates is not necessary, the meeting appointed for June 4 having been abandoned and notice given out that the next meeting will take place on Sept. 4. Opinions differ as to whether this action is due to an unusually good situation, or to a disturbed condition due to causes which cannot be dealt with successfully by the Presidents.

Bessemer Steel in Great Britain in 1900.

The total output of Bessemer steel ingots in the United Kingdom in the year 1900 was 1,745,004 tons, against 1,825,074 tons in the previous year. The total quantity of basic steel produced in 1900 by the basic Bessemer process was 491,101 tons, against 517,378 tons in 1899 and 504,134 tons in 1898. The Bessemer process continues to produce in Great Britain a larger quantity of basic steel than the open-hearth. In all six works are producing basic steel by the Bessemer system, and more than one-half of the whole is produced in the Cleveland district, where two works carry on the process. The output of Bessemer rails in the United Kingdom in the year 1900 was larger than in 1898, but considerably less than in 1899. The production in 1900 was 759,844 tons, against 838,148 tons in 1899, and 751,591 tons in 1898. The range of products from Bessemer steel is increasing every year. One establishment, which produced nearly 200,000 tons of ingots, made 12 different descriptions of finished products therefrom, of which about 60 per cent. was rails. Five Bessemer works, all of them operative in 1900, produced no rails at all.—*The Bulletin.*

Concerning Postage Stamps.

Mr. Daniels says that the device on the new Pan-American Exposition 2-cent postage stamp is the Empire State Express. Some indiscreet persons have said that it is the Black Diamond Express, which gives brother Daniels exactly the opportunity that he wants, and he does not delay to take that opportunity to set matters right in the newspapers. The 5-cent stamp contains a pretty picture of Mr. L. L. Buck's upper bridge over the Niagara gorge. This is a trolley and highway bridge known locally as the Clifton bridge, directly below the Falls. Our readers will remember that it is much the longest arch in the world, namely, 840-ft. span. The bridge was built for the Niagara Falls & Clifton Bridge Company by the Pencoyd Iron Works as contractors.

The Carnegie Research Scholarship.

The following are biographical details regarding the three gentlemen who have each been awarded an Andrew Carnegie Research Scholarship of £100 by the Council of the Iron and Steel Institute (British):

Alfred Stansfield, D. Sc. (London), Assoc. R.S.M., was born in 1871; educated at Ackworth School, the Bradford Technical College and the Royal School of Mines. In 1898 he was appointed instructor in assaying at the Royal College of Science. From 1891 to 1898 he made a number of researches for the Alloys Research Committee of the Institution of Mechanical Engineers. He is the author of several papers and reports.

John Alexander Mathews, Ph.D., M.A., B.Sc., F.C.S., of Brooklyn, United States, was born in 1872. He was educated at Washington and Jefferson College, and at the Columbia School of Mines, New York. He is the author of some ten papers in the Journal of the American Chemical Society, and in the New York School of Mines Quarterly.

Julius Goldberg, of Leoben, Austria, was born in 1876. He was educated at Kalish, in Russia, and at the University of Warsaw, and the Leoben School of Mines. He has had experience of practical metallurgy at Kertsch in Russia, and at Wissen, in Germany.

Steam Locomotive Run by Compressed Air.

An interesting feature of the Baldwin Locomotive Works' exhibit at the Pan-American Exposition is a large locomotive which will be jacked up and run by compressed air. This locomotive is to be supplied with compressed air from two No. 3 Pedrick & Ayer compressors, which will pump the air into the boiler of the locomotive.

St. Paul Union Depot.

The St. Paul Union Depot Company has begun work on extensive improvements in its property, including large additions to its yard along the river, involving the filling in of large quantities of earth, and the enlargement of the freight houses, and an increase of more than 100 per cent. in the capacity of the tracks at the passenger station. These passenger tracks now accommodate 84 cars, and it is proposed to make room for over 200. The total cost of the improvements proposed will be about $400,000.

Montreal, Ottawa and Georgian Bay Canal.

The charter for a canal from Georgian Bay via French River, Lake Nipissing, Mattawan River and Ottawa River to Montreal, has passed under the control of a strong syndicate, and on their behalf E. E. Sawyer, M. I. C. E., and J. Edgerley, of London, England, are in Canada investigating the route. Mr. Sawyer says that the proposed route will bring Montreal 80 hours nearer Chicago than by the Welland Canal, and, by providing for a 20-ft. navigation, wheat could be taken to Montreal for 1½c a bushel, against 1¼ at Buffalo. The present plans show that 50 locks would be required, but these, Mr. Sawyer believes, could be reduced by 15 or 20, and there would not be more than 32 miles of canal, which would include the Grenville and other canals already constructed. The company is asking the Government to guarantee interest on its bonds up to $60,000,000. The length of the proposed canal will be 330 miles.

Dock at Corinto.

The Government of Nicaragua has contracted with Mr. T. Solomon, an American citizen residing in Bluefields, for a dock at the port of Corinto. The dock is to be 500 ft. long by 315 ft. wide, and be built of iron; it is to cost $150,000 gold, and to be ready for use within one year. Mr. Solomon will be allowed to collect from 10 to 15 cents per hundredweight for freight and 10 cents for each passenger embarking at or disembarking from the port.

The St. Clair Steel Co.

Rapid progress is being made in building the new open-hearth steel plant of the St. Clair Steel Co., one of the interests of the Crucible Steel Co. of America, which is being built at Blair Station on the Pennsylvania R. R., about 25 miles from Pittsburgh. The work is in charge of the Garrett-Cromwell Engineering Co. of Cleveland, Ohio, Horace W. Lash being in immediate charge. The works at the start will consist of twelve 50-ton open-hearth furnaces, a 40-in. blooming and billet mill, and a number of finishing mills. The daily product will be about 1,200 tons. The works are so planned as to admit of indefinite enlargement. Most of the contracts have been let, and it is expected that the plant will be making steel early in the fall.

The St. Clair Furnace Co. has been incorporated also as a constituent company of the Crucible Steel Co. of America, to make pig iron to supply the steel companies. James E. Tatnall, heretofore Superintendent of the open-hearth department of the Bethlehem Steel Co., has been appointed Superintendent of the open-hearth department of the St. Clair Steel Co. G. G. Thorp, heretofore General Superintendent of the Joliet works of the Illinois Steel Co., is now General Superintendent of the St. Clair Furnace Co. and the steel works of the St. Clair Steel Co.

Southern Pacific Improvements at Guaymas, Mexico.

The Sonora Ry., a branch line of the Southern Pacific operated in Northwestern Mexico, has for its southern terminus on the Pacific or rather the Gulf of California, at Guaymas, one of the best harbors of the southwestern coast. Commercially this fine harbor has remained practically dormant, and notwithstanding the fact that a railroad has been in operation to it for 15 years. The unprecedented maritime activity on the whole Pacific coast, and the advent of new steamship lines has renewed attention to this favorably located port. The Southern Pacific has begun large improvements to its terminal properties. Wharfage facilities which never were meager are being added to. The main wharf connecting the mainland with a small island will be made a four-track structure, and will extend into the waters of Guaymas Bay 500 or 600 ft. in addition. Altogether preparations are to effect another transcontinental route for the southern and west coast trade, thus making a shorter route for this traffic which has heretofore gone to California and San Francisco.

The Railroad to Mecca.

As all the world knows, a railroad is to be built from Damascus to Mecca—some time. It appears that the Sultan has requested of the faithful to consecrate to that holy enterprise the skins of the skeep killed during the Courban Bairam, the Mohammedan New Year's feast. It is requested that these skins be turned in to an official auctioneer for sale, the fund resulting to be used to carry on this railroad. We do not swear that this is true, but give the story for what it is worth, and the ingenious reader may compute how many sheep must be slain to build the railroad.

Engaging Day Coach Seats.

The French State Railroads—a small system—have adopted the policy of engaging seats on certain express trains, just as we engage places in drawing-room and sleeping cars. These engagements can be made at Paris all the year round, at Royan, a watering place, during the summer season, and at Bordeaux during the winter season. A franc is paid for the engagement. After the train is made up and until it starts, you can engage a seat, of what are left, for half a franc in the first and second class, and for 5 cents in the third class. This is said to be taken from the German practice with their long through cars; but as the Germans took it from us, the French need not be grateful. It does not appear that in France this is looked upon as paying for the seat; and if the passenger waits till the train starts he will probably get one without paying, if any is left. In Germany the payment, as here, is for superior accommodations, not to be had without paying.

Electric Railroads in Saxony.

The latest statistics concerning the traffic of the Saxon electric roads during 1900 give a comprehensive survey. According to these returns, the traffic has increased considerably over that of last year, as a consequence of the opening of many new lines in the larger cities. The figures below show the extension in the faciltities.

	Length of lines. Miles.	Persons carried. Number.
Total, 1900	166.59	147,645,690
Total, 1899	137.54	113,592,390

The number of persons injured has increased in proportion to the increase in traffic. The serious and fatal accidents, which are included under one head, have increased from 0.61 to 0.69 for each million persons carried. Naturally, most of the accidents were the fault of the injured themselves, especially in case of persons jumping on and off cars while in motion. The number of such accidents in 1899 was 38, against 92 in 1900. Many women not only insist upon riding upon the front and rear platforms, but in getting on and off cars while in motion. Other lines will be built and extended in Saxony during the year, and large supplies of rails and equipment will have to be purchased.

The Military Railroads in South Africa.

In a despatch lately issued Lord Roberts says: "The difficult and arduous work performed by this department [Military Railway] reflects the greatest credit upon all concerned. The Orange River Colony and Transvaal Railways, embracing a length of 1,130 miles under the title of the 'Imperial Military Railways,' were taken over by this department as the country was occupied by Her Majesty's forces, and on the 30th of September, 1900, a staff of 17,874 officers and men was employed by it. From the outbreak of hostilities up to the 31st of August, 1900, these railroads had carried 177,000 passengers, 86,000 animals, and 520,000 tons of goods. All temporary repairs in Cape Colony, Transvaal, and Orange River Colony were carried out, with a few exceptions, by the military railroad staff. Up to the 31st of October, 1900, these temporary repairs included the restoration of 75 bridges, 94 culverts and 37 miles of line. A detail of the general advance from Bloemfontein to Johannesburg, a distance of 265 miles, will give some idea of the expedition with which repairs were effected. The period during which the advance was being made was from the 3rd of May to 11th of June, 1900, in which space of time the following temporary repairs were executed: Twenty-seven bridges, 41 culverts, 10 miles of line, including 7 deviations, varying in length from 200 yds. to two miles. From 6th of June to 15th of November, 1900, the Imperial Military Railways were more or less seriously damaged by the enemy on 115 occasions, but all such damages were promptly repaired, and did not materially affect the working of the railroads, except that the running of trains after dark had to be suspended. During the same period fully 60 per cent. of damaged bridges and culverts were permanently or semi-permanently repaired."

A Trolley Automobile Line in Germany.

A Berlin engineer has constructed a trolley automobile line similar to that exhibited at the Paris Exposition, at Eberswalde, a small city near the German capital. The automobile receives its motive power from an overhead wire by means of a trolley, which is connected with the automobile by a cable. This allows the vehicle to turn out on the road.

Retirement for Age in Belgium.

The Belgian State Railroads have issued orders, according to which its employees will be retired in November of the year in which they reach their 66th year, without special notification. Thus all employees born in the year 1835 will be retired next November. They will be entitled to pensions according to rank and time of service.

Concessions in Liberia.

The Liberian Government has granted to the Afro-American Steamship & Mining Company, of Boston, the right to establish a steamship line between Boston and Liberia; to build wharves, quays, railroads, and tramways; and to carry on a system of mining operations for a period of fifty years. The Liberian Government receives in consideration thereof $10,000.

LOCOMOTIVE BUILDING.

The Indiana, Illinois & Iowa has ordered 12 locomotives.

The St. Louis Southwestern is in the market for 10 mogul locomotives.

The Missouri Pacific is reported to be in the market for about 25 locomotives.

The St. Louis & San Francisco is said to be in the market for 20 locomotives.

The Morenci Southern is having two engines built by the Baldwin Locomotive Works.

The Ecuadorian Association is having two engines built by the Baldwin Locomotive Works.

The Southwestern Coal & Iron Co. is having five engines built by the Baldwin Locomotive Works.

The Southern Missouri & Arkansas is having one engine built by the Pittsburgh Locomotive & Car Works.

The Chicago, Milwaukee & St. Paul will build at its West Milwaukee shops, nine switching engines, Class F style. They are to be duplicates of those recently built.

The Alabama Great Southern is having four 20 x 26-in. consolidation locomotives built by the Richmond Locomotive Works. They will weigh in working order 142,500 lbs., with 124,900 lbs. on drivers, and will have 58 in. diam. driving wheels, driving wheel base 15 ft. 11 in., total wheel base 23 ft. 11½ in.; 61-in. extended wagon top boilers, steam pressure 200 lbs., fire-box 102¾ in. x 41⅞ in., 271 tubes 2 in. x 4⅝ in., and tank capacity for 5,000 gals. water.

CAR BUILDING.

E. Gould is having one coach built by the Pullman Co.

The Chicago City Street R. R. is in the market for 125 cars.

August Belmont is having one coach built by the Barney & Smith Car Co.

The New York Central & Hudson River, it is rumored, is in the market for cars.

S. Pearson & Co. are having 50 freight cars built by the American Car & Foundry Co.

The Vera Cruz & Pacific is having 30 freight cars built by the American Car & Foundry Co.

The Colorado & Southern is in the market for 50 box cars of 60,000 lbs. capacity.

The National of Tehuantepec is having 29 freight cars built by the American Car & Foundry Co.

The Hancock & Calumet has ordered 175 cars of 60,000 lbs. capacity from the American Car & Foundry Co.

The Fort Smith & Western has ordered 300 coal cars for August delivery from the Illinois Car & Equipment Company.

The Southern Pacific has ordered 25 cars for passenger service from the Pullman Co., and 20 from the American Car & Foundry Co.

The San Pedro, Los Angeles & Salt Lake is reported to be in the market for 300 freight cars, the specifications for which are in the hands of builders.

The Chesapeake & Ohio has ordered 400 hopper bottom cars of 100,000 lbs. capacity from the Pressed Steel Car Co., to be exact duplicates of those recently built.

The Atlantic Coast Line is building 100 box cars at its

own shops. They will have Keystone body and truck bolsters, American all-steel couplers and Thornburgh tandem draft rigging attachments.

The Rio Grande Western order for cars, noted in our issue of May 17, was incorrect. The item should have stated that the road has ordered 50 standard Rodger ballast cars and one standard distributing car.

The Ingolsby Automatic Car-Co., of St. Louis, has ordered 315 automatic dump cars of 100,000 lbs. capacity from the American Car & Foundry Co. Part of these are to be of steel and the balance wood. They will be equipped with Sterlingworth brake-beams.

The Chicago Great Western has ordered 800 box and 500 flat cars of 60,000 lbs. capacity from the American Car & Foundry Co.; 200 gondola cars of 70,000 lbs. capacity from the Illinois Car & Equipment Co.; and is about to place an order for 200 stock cars and 20 cabooses.

The Southern Pacific has ordered 100 standard Rodger ballast cars, 80,000 lbs. capacity. They will measure 34 ft. long, and will be equipped with air and vertical hook couplers. The road has also ordered 100 standard distributing cars with double plows. This order is in addition to the one recently placed.

The Fort Smith & Western has ordered 300 coal cars of 80,000 lbs. capacity, for September delivery, from the Illinois Car & Equipment Co. They will weigh 33,700 lbs., will be 36 ft. long, 9 ft. 8½ in. wide and 4 ft. high. They will be equipped with Bettendorf bolsters, Monarch brake-beams, Westinghouse brakes, Buckeye couplers, Dayton draft rigging, McCord journal boxes and French springs.

The Missouri Pacific has ordered 500 flat cars of 60,000 lbs. capacity for August delivery from the American Car & Foundry Co. They will weigh 27,000 lbs., measure 40 ft. long over end sills, 8 ft. 10¼ in. wide over side sills, 4 ft. 4¾ in. to top of floor. The specifications include Monarch brake-beams, Westinghouse brakes, Universal car bearings, Trojan couplers, Miner draft-rigging, McCord journal boxes and box lids, Patterson-Sargent paint, Pickering springs and Ployer trucks.

BRIDGE BUILDING.

Benwood, W. Va.—According to report Albert Lucius, of New York, has prepared plans for the bridge of the Wheeling, Bellaire & Benwood Bridge Company over the Ohio River between this city and Bellaire, Ohio. The bridge is to carry two trolley lines and general traffic.

Boston, Mass.—The Harbor and Land Commissioners have recommended to the Legislature that a bridge be built over Fort Point Channel from Oliver street and Atlantic avenue to the docks in South Boston.

Bridgeport, Conn.—John J. O'Brien, of New York, has been awarded the contract for building the substructure for the four-track Scherzer rolling lift bridge across the Pequonnock River for the New York, New Haven & Hartford. The contract for the superstructure is not yet awarded. (May 3, p. 305.)

Bristol, Tenn.—A bridge over the Watauga near Bristol was destroyed by the flood early last week.

Camden, N. J.—According to report the Board of Freeholders will want bids some time this summer for a bridge over Cooper's Creek, at either Pine or Spruce streets.

Cedar Falls, Iowa.—The Chicago Great Western is reported considering building two steel bridges across the mill races in Cedar Falls.

Charlottetown, Prince Edward Island.—The Hillsboro bridge will be rebuilt at an early date.

Chattanooga, Tenn.—The Chattanooga Electric Ry. will soon let a contract for a bridge on Harrison avenue.

Chester, Mass.—A hearing was given, May 27, on proposed changes in grade crossings over the Boston & Albany in this town. The railroad has submitted plans proposing two overhead crossings and two crossings under the tracks.

Chicago, Ill.—The time for receiving the bids for a rolling lift bridge at Randolph street is extended to June 5.

The County Board is considering building an $11,000 steel bridge over Calumet River, near Blue Island, also a steel bridge across Little Calumet River at 147th street, to cost about $18,000.

Once more the Board of Local Improvements has under consideration the question of connecting the North and South Side boulevard systems by a viaduct. The engineering department is preparing plans upon which to base an estimate for the Council in accordance with an order passed May 20. For twelve years this question of connecting the Lincoln and South Side park and boulevard systems by a viaduct or subway has been agitated. The present resolution calls for an estimate for the extension of the boulevard system from a point on Chicago avenue east of St. Clair street to Indiana street, with a driveway 100 ft. wide. From Indiana street the order asks for an estimate for approaches and a viaduct running in a southwesterly direction to Randolph street. The plans contemplate the removal of the Illinois Central bridge and replacing it with a double-decked bascule bridge accommodating both the railroad and the driveway.

Delphos, Ohio.—The Commissioners of Allen and Van Wert counties are considering rebuilding the bridge at Third street.

Denver, Colo.—The City Engineer is making plans for a viaduct proposed over the railroad tracks and the Platte River on 19th street, from Wazee street.

Wm. P. Jones, Engineer of the Department of Public Works, has submitted an estimate of $610,000 for a viaduct from Seventh and Curtis streets to Boulevard F. The structure will be 5,280 ft. long, have two 5-ft. sidewalks and a 28-ft. roadway.

Dublin, Ga.—The bids for building the extension to the Oconee River bridge will be opened on July 15. The work includes steel work about 1,100 ft. long and 18 ft. wide. Plans were made by George H. Crafts & Co., Atlanta, Ga.

Duluth, Minn.—The Board of Public Works is receiving bids for the steel work for the Garfield avenue viaduct. It will be a plate girder structure, 1,200 ft. long. W. B. Patton, City Engineer.

East Liverpool, Ohio.—Plans and specifications are being made by the American Bridge Co., of Pittsburgh, for two bridges over the Ohio River, one at the west end of Liverpool and the other at Wellsville, crossing the river at Congo. Both will be cantilever bridges.

Elizabethton, Tenn.—See Watauga, Tenn.

Evansville, Ind.—Bids are wanted, June 13, for the new approach to the Franklin street bridge, for which $20,000 is appropriated. L. H. Legler, County Auditor.

Fairport, N. Y.—It is proposed to replace the Fuldamtown bridge over the canal with a lift bridge. The plans will be made by the State Engineer.

Fort Keogh, Mont.—The Secretary of War has approved the application of the County Commissioners for a bridge over the Yellowstone at a point in the Fort Keogh military reservation.

Fort Smith, Ark.—The Commercial Club is arranging to build a pontoon bridge across the Arkansas River.

Fort Worth, Texas.—It has been decided to build a 600-ft. wooden viaduct over the tracks of the Texas & Pacific on Jennings avenue. The railroad company has given $15,000 toward the cost. (May 10, p. 321.)

Franklin, Pa.—The bridge proposed over French Creek at Thirteenth street will be 432 ft. long, have a 28-ft. roadway and two 8-ft. walks. The County Commissioners want suggestions.

Greencastle, Ind.—Bids are wanted, June 4, for four steel bridges. P. F. Stoner, County Auditor.

Joplin, Mo.—The County Court is reported to have appropriated $14,685 for bridge work.

Kansas City, Mo.—The plans for the proposed bridge over the Missouri River, on the site of the old Winner bridge, and the terminal facilities with approaches, proposed by the Union Bridge & Terminal Co., successor to the Kansas City & Atlantic R. R., were illustrated in the Kansas City *Star*, May 19. The bridge is to be a three-deck structure for the joint use of steam railroads, electric railroads, and highway traffic. Theo. C. Bates is President of the company, 95 Milk street, Boston, Mass.

Milwaukee, Wis.—An ordinance for an issue of $100,000 bridge bonds is before the Council.

Muncie, Ind.—The Council has made allowances for bridge improvements, one being for a $4,000 bridge across the Mississinewa River, near Granville. The Muncie Creek bridge is to cost $2,000, the Koontz bridge $1,800.

Norristown, Pa.—A deck plate girder bridge of two spans, each 60 ft., is proposed over Stone Creek on Markley street, but the work may not be authorized this year. S. Cameron Corson, Borough Engineer.

Philadelphia, Pa.—The Engineering Department of the Pensylvania Railroad is making plans for two bridges across the Schuylkill River in connection with the rearrangement of tracks on the west side of the river in connection with the proposed new passenger station to be built at Thirty-second and Market streets. The plans will be submitted to the Secretary of War for approval, then bids will be invited. The new bridges will be located on either side of the present brige. The eastern end of the southerly bridge will be located 50 ft. to the southward of the present structure and, crossing the river at an acute angle, its western end will be 130 ft. south of the present bridge. This new bridge will be a steel deck structure, with two tracks, the level of which will be 9 ft. above that of those on the present bridge. The bridge to the northward, and which will be known as the Philadelphia, Wilmington & Baltimore bridge, will also cross the river diagonally, the eastern end being 50 ft. north of the present bridge and the western end 90 ft. to the northward. This bridge will be a steel through girder bridge, with two tracks, and will be built on a grade. The tracks on the eastern end will be 5 ft. below the level of those on the present bridge, and at the western end they will be 9 ft. lower. The plans for the station have not been made and the work on it may not be begun for about a year.

Pittsburgh, Pa.—The Nelson & Buchanan Co., which had the contract for the new South Tenth street bridge over the Monongahela, has assigned the work to the American Bridge Co.

Plans for the Lincoln avenue bridge are finished and Director Wilson is reported as saying that he will let the contract within 60 days. (May 3, p. 306.)

Port Hawkesbury, Cape Breton, N. S.—Robert J. Campbell, President of the Cape Breton Railway Extension Co., will soon ask tenders for a bridge over the Straits of Canso.

Rochester, N. Y.—A bill has been signed by the Governor to appropriate $50,000 for a lift bridge over the Erie Canal at Plymouth avenue.

Shreveport, La.—Bids are wanted, until June 13, for a steel bridge 375 ft. long over Cross Bayou at Market street. Address P. P. Keith.

Syracuse, N. Y.—The Syracuse Rapid Transit Co. is making plans for a new bridge to replace the old Warren street bridge over the Erie Canal.

Vicksburg, Miss.—Wm. T. Rigby, Acting Chairman of the Military Park Commission, writes that bids have not been asked for the three bridges on the Park Roadway. Persons desiring to bid on the work should address his office.

Washington, D. C.—The board appointed to select a site, formulate plans, specifications, and estimates for a highway bridge across the Potomac to replace the Long Bridge and to be located within 500 ft. of that structure has practically completed its report and will soon submit it to the Secretary of War. The board is composed of the following officers of the Corps of Engineers: Lieut. Col. Charles J. Allen, Capt. Edward Burr, Capt. Lansing H. Beach, and First Lieut. George M. Hoffman, recorder. The bill passed by Congress in February authorizes the Secretary of War to enter into a contract with the Baltimore & Potomac Railroad to construct this highway bridge. The sum of $568,000 has been appropriated, and the structure must be completed by Feb. 12, 1903. The plans favored by the Engineer Board will make the bridge cost $568,000 and provide for a steel structure on masonry piers. There will be seven spans, each 250 ft. long and two spans, each 200 ft. long, with a draw span 250 ft. This will give the bridge a total length of 2,400 ft. There will be nine piers and two abutments of masonry. The draw pier will contain 1,840 cu. yds. of masonry. The floor of the bridge will consist of steel plates covered with asphalt. The piers will be 115 ft. farther apart than those of the Long Bridge. The draw will be 68 ft. wider than that on the old bridge. The approach at the north end will consist of a causeway paved with stone, with a 100-ft. bridge over the outer lock. At the south end the causeway will be paved with stone. This bridge is to be used only for highway traffic, the Baltimore & Potomac Railroad being required to replace the Long Bridge with a steel railroad bridge within four years. The highway bridge will be open for the use of all street railroad companies chartered by Congress. The Washington, Alexandria & Mount Vernon Railroad Company is required to cease operating on the Long Bridge and to lay its tracks on the new structure. No overhead wires will be permitted and an underground electric system must be laid. Each street railroad using the bridge will be required to pay in taxes one-half of 1 per cent for each passenger carried across the bridge. The cost of the new structure will be divided between the District of Columbia and the United States Government. Bids will be wanted as soon as the Secretary formally adopts the report and accepts the plans.

Watauga, Tenn.—Among the bridges washed away during the flood last week are: An iron bridge on the Virginia & Southwestern Railroad, over the Watauga River, at Elizabethton, Tenn.; the county bridge, at the same place; the Southern Railway bridge, over the Watauga River, at Watauga; Ohio & Charleston bridge, over the Watauga River, and the county bridge near by. Many smaller bridges and trestles were swept away on five of the railroads in this section.

Wilkesbarre, Pa.—Proposals will be received by the County Comptroller until noon, June 1, for six iron bridges, and 49 stone arch bridges. Plans and specifications may be seen at the office of Joseph D. Lloyd, County Comptroller.

Other Structures.

Bayport, N. Y.—A passenger station will be built at this place by the Long Island R. R.

Bridgeport, Pa.—The Philadelphia & Reading will enlarge the roundhouse at Bridgeport.

Coatesville, Pa.—The Lukens Iron & Steel Co. is reported to have let a contract for a 116-in. plate mill. When finished the plant will have a capacity of 200,000 tons of finished plates a year.

Collinwood, Ohio.—Contracts have been let for building the large repair shops near Cleveland for the Lake Shore & Michigan Southern. The American Bridge Co. will supply the structural steel, which will be 3,000 tons. The Philadelphia Engineering Co., branch of the Niles-Bement-Pond Co., has a contract for a 100-ton, a 30-ton, a 10-ton and one 7½-ton jib crane. All of the machinery in the shops will be electrically driven. The buildings will include locomotive shop, blacksmith shop, woodworker shop, machine shop, paint shop and power house.

Columbus, Ohio.—We are told that bids will be wanted, late in July, by Hugh M. Steele, Chief Engineer, Central of Georgia Ry., for the Union passenger depot in Columbus. It is to be a brick and stone structure of two stories, 50 x 233 ft. and 30 ft. high. It will be used by the Central, Southern and Seaboard Air Line and will cost about $30,000. Work will begin July 1.

Danville, Pa.—Fire in the Reading Iron Works, on May 24, caused a loss of between $100,000 and $125,000. The bar and skelp mills, the roll shops and part of the puddle mill are destroyed.

Decatur, Ala.—The State Railroad Commission has notified the Louisville & Nashville and the Southern Ry. that the depot accommodations must be improved within 90 days. Both roads are considering building a union station.

Ensley, Ala.—The Osborn Engineering Co., of Cleveland, Ohio, is making plans and specifications for the new plant of the Southern Car & Foundry Co., to be located at Ensley. Part of the buildings will be of brick and steel, and part of wood and corrugated iron. Electric transmission of power will be installed. There will be 500 h. p. boilers. J. M. Elliott, Jr., President, will let the contracts.

Houghton, Mich.—The Duluth, South Shore & Atlantic will build large coal docks here next summer.

Kokomo, Ind.—The Kokomo Wire & Nail Co. proposes to build another wire mill which will take the surplus capacity of rods not consumed in the present plant. The location of the new plant is not determined upon, but it will probably be along the Ohio or Mississippi Rivers. Orders for machinery will soon be placed.

La Grange, Ill.—The Burlington will build a passenger station at La Grange, which will be of light pressed brick with Bedford stone trimmings, and will be 42 x 81 ft.

Natchez, Miss.—The Yazoo & Mississippi Valley (Illinois Central) will build a 100-ft. extension to the freight house; also a second story to the present office building.

Philadelphia, Pa.—The Pennsylvania will build a new station on Thirty-second street north of Market in West Philadelphia. (See Bridge Building.)

Racine, Wis.—The Chicago & Northwestern will soon begin work on the proposed $50,000 passenger station in this city. The new structure will be of stone and located just south of State street.

Riverside, Ill.—The Burlington will build a passenger station at this place which will be 34 x 100 ft., with covered platforms at both ends 61 ft. long. A waiting room 16 x 28 ft. will be built on the north side of the tracks and will be connected with the main station by a tunnel 100 ft. long.

Virginia, Minn.—The Interstate Iron Co. has been incorporated in Minnesota, with a capital stock of $2,000,000. The incorporators are: H. H. McKeehan, John A. Garfield and Gustave von den Steinen, of Glenville, Ohio. The office is Virginia, Minn.

Winnipeg, Manitoba.—Announcement is made that the Canadian Northern shops at this city will be enlarged and equipped to make box cars.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

Rates to the Convention.

The supply men have been granted a round-trip fare of 1½ single fares to the Master Car Builders' and Master Mechanics' Association.

International Association of Municipal Electricians.

The sixth annual convention will be held at Niagara Falls, N. Y., Sept. 2, 3 and 4, 1901. This promises to be one of the best meetings ever held by this Association, both in attendance and subjects to be brought before the convention. Frank P. Foster, Secretary, Corning, N. Y.

The Engineers' Club of Philadelphia.

A business meeting of the Club, the last before the summer recess, will be held on Saturday, June 1, at 8 o'clock p. m. The topical discussion will be "The Duty of the Engineer;" "To Himself and His Profession," by Edgar Marburg; "To His Clients or Employers," by James Christie; "To His Contractors or Employees," by L. Y. Schermerhorn; "To the General Public," by John C. Trautwine, Jr.

International Association of Car Workers.

This is the name of a new organization formed at Buffalo, N. Y., last week. It is said that it will take in car repairers, car inspectors, air brakemen, conductors, brakemen, cleaners, laborers and, in fact, everybody connected with work on steam cars. The new organization has received the indorsement of Samuel Gompers and his colleagues in the American Federation of Labor. The officers are: President, A. T. Fish, Buffalo; First Vice-President, P. L. Anderson, Chicago; Second Vice-President, B. A. McClusky, New Orleans; Third Vice-President, E. C. Potts, Dover, N. J.; Secretary and Treasurer, A. D. Wheeler, Buffalo.

The Glasgow Engineering Congress.

An international engineering congress will be held in Glasgow Sept. 3 to 6. Lord Kelvin is the Honorary President, and the President is James Mansergh, Esq., President of the Institution of Civil Engineers. Among the Vice-Presidents are the names of a number of distinguished men. Sir Douglas Fox is Chairman of the London committee; Robert Caird, Esq., President of the Institution of Engineers and Shipbuilders in Scotland, is Vice-Chairman of the General Committee and Chairman of the Executive Committee. Section 1 of the congress is railways, and the Chairman of this is Sir Benjamin Baker; the Honorary Secretary is R. Elliott Cooper, Esq., No. 8 The Sanctuary, Westminster, S. W. The other sections cover waterways and maritime works, mechanical engineering, naval architecture and marine engineering, iron and steel and mining, municipal, gas and electrical engineering.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. O. Ott, at one time Purchasing Agent of the Illinois Central, died recently at Chicago, Ill., aged 81 years.

—Mr. F. W. Hills, who recently resigned as Auditor of the Oregon Short Line, will on June 1 assume the duties of Comptroller of the American Smelting & Refining Company, with headquarters at New York city.

—Mr. William Forsyth will be offered an appointment at Purdue University at the June meeting of the Board of Trustees, and it is understood has consented to accept the appointment. This will be as Associated Professor in charge of locomotive and car design.

—Col. George W. M. Reed, a prominent manufacturer, died at his home in Tariffville, Conn., May 22, aged 60 years. He was Vice-President and Treasurer of the Pratt & Whitney Machine Works, of Hartford, under the reorganization of that company in 1892.

—We announced recently the fact that Mr. Charles M. Jarvis had withdrawn from the American Bridge Company. In an interview recently published he confirms the earlier statement that he has withdrawn from all connection with the American Bridge Company, although still retaining a financial interest in the United States Steel Corporation, and further, that he takes this step simply because he did not care to go to Pittsburgh to live. He proposes now to take a rest, but may be ready to go into business again within a few months.

—Mr. E. M. Alvord, recently appointed Superintendent of the Missouri, Kansas & Texas, was born July 2, 1859, at Olney, Ill. He began his railroad career in 1876 as a night operator on the Ohio & Mississippi and as an operator and agent of the Texas & Pacific. He then held various positions such as agent and train despatches, general material and transportation agent with different companies until 1882, when he was appointed Trainmaster and Superintendent of Telegraph of the Fort Worth & Denver City, and he was also from 1884 to 1888 General Roadmaster of the same company. Mr. Alvord then became Fuel and Purchasing Agent of the International & Great Northern, which position he held for three years, and at the end of which time he took the position of General Superintendent of the East Line & Red River. He was, previous to his appointment as Superintendent of the Missouri, Kansas & Texas, General Superintendent of the Sherman, Shreveport & Southern, which company was recently absorbed by the Missouri, Kansas & Texas.

—Mr. Job H. Jackson, President of The Jackson & Sharp Company, died at Wilmington, Del., Thursday, May 23. Mr. Jackson was born in Chester County, Pa., Feb. 11, 1833, and his career was the typical one of the American citizen of his generation. He got his schooling before he was 14 and then went to Wilmington, where he began work as a grocer's boy and finally was apprenticed to a tinsmith. Again, like the typical American boy of his time, he became a foreman before his apprenticeship was ended. In 1853 Mr. Thomas T. Eckert put young Jackson in charge of building a telegraph line for the Ohio & Pennsylvania Telegraph Company (of which Eckert was then Superintendent) from Crestline to Allegheny. After this he returned to the hardware store and tin shop until 1863, when the Delaware Car Works were established by Mr. Jackson and Mr. Jacob F. Sharp, under the name of Jackson & Sharp. In 1870 the firm was succeeded by a stock company, The Jackson & Sharp Company, of which Mr. Jackson became President. Of course the readers of the *Railroad Gazette* are comparatively familiar with the work of this company as we have frequently had occasion to mention their contracts and describe their product. Quite lately the business was sold to the American Car & Foundry Company, and it was Mr. Jackson's intention to retire from business for the rest of his life. Although he was a quiet and industrious business man he was really interested in public affairs and did a great deal of useful work in the community in which he passed his life. He served as a member of the City Council and of the Board of Public Education, also as President of the Board of Port Wardens, as a director of the Young Men's Christian Association and a director of a savings bank and an insurance company. He was also active in the affairs of the Methodist Episcopal Church, of which he was a member all his life. In lines closely allied to the business of his works he was President of the Woodruff Sleeping Car Company, the Union Palace Car Company and the Ohio River & Charleston Railroad.

ELECTIONS AND APPOINTMENTS.

Arkansas Southern.—J. M. Walsh has been appointed Superintendent, with headquarters at Ruston, La.

Atchison, Topeka & Santa Fe.—C. W. Kouns having been assigned to other duties (p. 356) the position of Assistant General Superintendent has been abolished, effective May 13.

Baltimore & Ohio.—Press despatches of the 25th said definitely that Mr. Loree has been elected President of the Baltimore & Ohio, that the official announcement was to be made on the 29th and the change to become effective June 1. As we must go to press before the official announcement we can only speak of this as a rumor. If it should prove to be true it would, we suppose, imply the complete control by the Pennsylvania of the affairs of the Baltimore & Ohio, for it seems unlikely that Mr. Loree would step out of the line of the Pennsylvania. According to later press reports Mr. Cowen is to become Counsel for both the Baltimore & Ohio and the Pennsylvania, and George L. Potter, now General Manager of the Pennsylvania Lines West, will be made General Manager of the B. & O.

Blackwell, Enid & Southwestern.—H. C. Brown, heretofore Assistant General Freight and Passenger Agent of the Kansas City Northwestern, has been appointed Traffic Manager and General Auditor of the B. E. & S. (See R. R. Construction column.)

Chicago & Northwestern.—E. H. Wade has been appointed Master Mechanic of the Northern & Western Iowa Divisions, with headquarters at Eagle Grove, Iowa, succeeding F. G. Benjamin, transferred. A. B. Quimby, heretofore a Division Foreman, will succeed Mr. Wade as Assistant Master Mechanic of the Wisconsin Division, with headquarters at Chicago, Ill.

Cincinnati, Portsmouth & Virginia.—T. D. Rhodes, Assistant General Passenger Agent, with headquarters at Cincinnati, Ohio, has resigned.

Davenport, Rock Island & Northwestern.—E. F. Potter has been appointed Chief Engineer, with headquarters at Davenport, Iowa.

Great Northern.—C. F. Newell has been appointed Acting Assistant Superintendent of the Dakota Division, with headquarters at Larimore, N. Dak., succeeding W. H. Hill, transferred. Acting Assistant Superintendent F. C. Webb has been appointed Assistant Superitendent of the Willmar Division and the Willmar & Sioux Falls Railway, with headquarters at Willmar, Minn., effective May 27.

Greenwich & Jacksonville.—Through change of ownership the following officers have been elected: President, I. C. Blandy, Greenwich, N. Y.; Vice-President, G. F. Blandy, New York, N. Y.; Secretary, D. A. Bullard, Schuylerville, N. Y., and Treasurer, C. P. Noyes, New York, N. Y.

Illinois Central.—D. W. Ross, heretofore Chief Clerk in the office of the Second Vice-President, has been appointed General Purchasing Agent, with headquarters at Chicago, Ill., succeeding C. A. Beck, resigned to become Chairman of the Company's Board of Pensions.

Kansas City Southern.—W. C. Dennis has been appointed Assistant General Freight Agent with headquarters at Kansas City, succeeding Chas. E. Perkins, transferred.

Missouri Pacific.—C. E. Styles has been appointed Assistant General Passenger Agent, with headquarters at Kansas City.

Ohio Southern.—H. G. Myers, Auditor, with headquarters at Springfield, Ohio, has resigned.

Oklahoma Central & Southeastern.—The officers of this company, referred to in the Construction column, are: President and General Manager, Edmund Frantz; Secretary and Treasurer, O. J. Fleming; Counsel, W. O. Cromwell; Vice-President, John Linden, all of Enid, Okla. T.

Rio Grande, Sierra Madre & Pacific.—J. T. Logan, General Traffic Agent, with headquarters at El Paso, Texas, has resigned.

Santa Fe Pacific.—C. S. Sutton, Auditor, with headquarters at Los Angeles, Cal., has resigned.

Seattle-Tacoma Interurban (Electric).—The officers of this company, referred to in the Construction column, are: President, Jacob Furth, Seattle, Wash.; Vice-President, Henry B. Sawyer, 93 Federal street, Boston, Mass.; Treasurer, W. Cameron Forbes, 93 Federal street, Boston; Assistant Treasurer, Frank Dabney, Seattle; Secretary, Geo. Donworth, Seattle; Chief Engineer, H. Day Hanford, Seattle.

St. Louis Southwestern.—W. N. Neff has been appointed Superintendent of the St. Louis Southwestern of Texas, with headquarters at Mount Pleasant, Texas, succeeding A. B. Liggett, resigned. E. A. Peck succeeds Mr. Neff as Superintendent of the St. L. S. W., with headquarters at Pine Bluff, Ark. W. J. Miller has been appointed Master Mechanic at Tyler, Texas, of the St. L. S. W. of T., succeeding C. J. Langston, resigned, effective June 1.

Southern Missouri & Arkansas.—Van R. Caldwell has been elected Treasurer, with headquarters at Cape Girardeau, Mo., succeeding Costello Lippitt. The position of Cashier, held by Mr. Caldwell, has been abolished.

Southern Pacific.—J. B. Wright, Division Superintendent, with headquarters at Sacramento, Cal., has resigned.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALABAMA ROADS.—The Alabama Pyrites Co. has made survey for a line from Talladega to their mines, seven miles north of Ashland.

ALABAMA ROADS (ELECTRIC).—John W. Oneil, President of the Birmingham Board of Trade, has presented to the Board a proposition to build an electric line from Wylan through Birmingham, with branches to outlying coal towns. A franchise will be asked from the city.

ALBIA ELECTRIC LIGHT & POWER.—Interests identified with this company are considering the proposition of building about 17 miles of extensions from Albia, Iowa, to connect six adjoining towns. Elias Clifton, of Albia, is Superintendent.

ALGOMA CENTRAL.—Exploration parties are to be sent to the shores of James Bay to locate the continuation of this line northward. (Construction Supplement, March 8, 1901.)

ATCHISON, TOPEKA & SANTA FE.—Work is to be begun soon, according to report, in relaying track between Barstow, Cal., and Mojave, 71 miles, with 75-lb. rail.

Surveys are reported in progress for the extension from Ripley, Okla. T., through Chandler and Shawnee to a connection with the Gulf, Colorado & Santa Fe at Purcell, Ind. T.

AURORA, ELGIN & CHICAGO (ELECTRIC).—Bracey, Howard, Foster & Co., of Chicago, have the contracts for this line from Aurora, Ill., east into Chicago, building to be completed by Oct. 15. Chas. Jones, 100 Washington street, Chicago, is Chief Engineer.

BALLSTON TERMINAL ELECTRIC.—The stockholders, on May 23, voted to increase the capital stock from $300,000 to $1,500,000, and to increase the bond issue from $200,000 to $1,200,000 for extending the line from Ballston to Amsterdam, about 20 miles.

BELLEFONTE CENTRAL.—An officer denies the report that the line is to be extended from Pine Grove Mills, Pa., to Spruce Creek. (May 24, p. 357.)

BLACKWELL, ENID & SOUTHWESTERN.—A contract has been closed between this company and the city of Vernon, Texas, for an extension of the line to that place. The road will cross the Red River 10 miles east of Vernon, below the mouth of the Pease River. The company is building from Blackwell, Okla. T., on the Atchison, Topeka & Santa Fe, southwest via Eddy and Vermont to Enid. Ed L. Peckham, of Blackwell, Okla. T., is President and General Manager. (Construction Supplement, March 8, 1901.)

BOSTON & MAINE.—The Concord & Montreal will award the contracts for its new electric line from Concord, N. H., to Nashua as soon as locations are completed. It is to be built from Concord to Manchester this summer. (April 19, p. 275.)

CANADIAN PACIFIC.—The company has filed with the British Columbia Government plans for the Coast-Kootenay line from the Pacific coast to Hope Mountain, about 100 miles.

CAPE BRETON RAILWAY EXTENSION.—Building is to be begun, on June 1, on the Island of Cape Breton for this proposed line on the east coast, to run from Louisburg southeast 86 miles to Hawkesbury, on the Straits of Canso, with a branch to Sydney. Robert J. Campbell, of New York, President, is reported as saying that the company will build to St. Peters, 30 miles, this year, and will complete the line in 1902. The company has power to bridge or tunnel the Straits. (Construction Supplement, March 8, 1901.)

CENTRAL NEW ENGLAND.—The Connecticut House has voted in favor of the bill to permit the crossing of the 300-ft. section through the Montague Farm at East Granby. The Senate later voted against the bill.

CHICAGO, JEFFERSON CITY & SPRINGFIELD.—Two surveys are reported made for this proposed line from Versailles, Mo., to Springfield, one through Lebanon and the other through Cross Timbers, Climax Springs and Proctor. Col. R. G. Scott, of Versailles, is General Manager.

COPPER BELT.—This company was incorporated in Utah, May 17, with a capital stock of $100,000, to operate under lease the line now building by the Rio Grande Western from Bingham to the mines of the Bingham Copper & Gold Mining Co., about three miles. Wm. Bayly, of the mining company, is President. (Construction Supplement, March 8, 1901.)

CORAOPOLIS & MONACA STREET (ELECTRIC).—Right of way has been obtained, according to report, for practically the entire distance on this connecting line from Coraopolis, Pa., where connection will be made with the Beaver Valley Traction into Beaver and neighboring towns. The road will parallel the Pittsburgh & Lake Erie and extend along the south bank of the Ohio, being about 15 miles long.

CROWS NEST SOUTHERN.—The bill for the incorporation of this company has been withdrawn from the Canadian Parliament owing to the imposition of a tax of $3 per ton on all coal exported. The road will be built under the British Columbia charter. (April 26, p. 292.)

DANIELSON & NORWICH ELECTRIC.—Building is reported begun at Central Village, Conn., on this line from Danielson south about 25 miles through Wauregan, Central Village, Moosup, Plainfield and Jewett City to Norwich.

DECATUR, DANVILLE & SOUTHWESTERN.—John Carlisle, of Cincinnati, and Gustav Bottiger, of Stockholm, Sweden, have been at Decatur, Ala., locating a survey of this proposed line through Alabama.

DELAWARE & HUDSON.—At a special term of the Supreme Court at Saratoga, N. Y., application was made for an order authorizing the building of a branch from Fort Edward to South Glens Falls.

DETROIT & MONROE (ELECTRIC).—The Michigan Secretary of State refused to accept the title of the Detroit & Toledo Short Line, as being too near that of the Detroit & Toledo Shore Line, and the title has been changed so that given above. (D. & T. Short Line, May 24, p. 357.)

DETROIT, HOWELL & LANSING (ELECTRIC).—This company has been incorporated in Michigan, with a capital stock of $500,000, to build from Detroit west through Howell to Lansing. The Detroit Construction Co. is interested.

DETROIT, PLYMOUTH & NORTONVILLE (ELECTRIC).—Right of way is reported secured for the proposed extension from Plymouth, Mich., east into Detroit. Under the franchise this extension must be completed within six months.

EASTERN OF ALABAMA.—Surveys are completed and the engineers are estimating the cost of this proposed line from Talladega, Ala., east about 25 miles to Lineville. E. V. Evans, of Chicago, and A. O. Smith, of Atlanta, Ga., are interested. W. H. Boynton, of Talladega, is among the incorporators. (May 10, p. 323.)

EASTERN INDIANA TRACTION (ELECTRIC).—Right of way is reported obtained for this line from Muncie, Ind., northeast to Fort Wayne. The company has been incorporated with a capital stock of $1,500,000. S. M. Hexter, S. A. Scheuer and A. Wellenthal, of Cleveland, Ohio, are interested.

GORDON TRACTION (ELECTRIC).—Application has been made to the Council of Lansing, Mich., for a franchise through that city for this proposed line from Battle Creek north via Olivet, Bellevue, Charlotte, Potterville, Diamondville and Millets to Lansing. It is stated that

franchises have been obtained through all the towns but one.

Illinois Central.—Surveys are reported being made for a branch from a point near Oglesby, Ill., to Peoria and Pekin.

Indiana Roads (Electric).—The business men of Wabash and Rochester are taking steps for building a line to connect the two cities via Roann, Gilead and Akron. Subsidies of $100,000 will be asked.

Indianapolis & Martinsville Rapid Transit (Electric).—Building is reported begun on this line from Indianapolis, Ind., southwest about 30 miles via Mooresville to Martinsville. Chas. Finley Smith, of Indianapolis, is President. (May 17, p. 342.)

Indianapolis & Southwestern Traction (Electric).—This company was incorporated in Indiana, May 16, with a capital stock of $50,000, to build a line from Indianapolis southwest to Martinsville, over practically the route of the Indianapolis & Martinsville Rapid Transit. Surveys are reported in progress. J. C. Tarkington, of Indianapolis, and R. E. Field, of Cincinnati, Ohio, are interested.

Interstate Railway, Light & Power (Electric).—Building is to be begun about July 1, according to report, on this line from Paris, Ill., to Clinton, Ind., 56 miles. Contracts for building equipment will be let about June 20. The central office is Paris, Ill. A. J. Hunter is President, and Geo. R. Grimes, Engineer.

Jarvisville & Ten Mile.—Right of way is secured for this line from Jarvisville north 19 miles down Ten Mile Creek to a point on the West Virginia Short Line. J. H. Davis, of Clarksburg, W. Va., is Chief Engineer. (Construction Supplement, March 8, 1901.)

Joliet, Plainfield & Aurora.—This company has been incorporated in Illinois, with a capital stock of $50,000, to build a railroad connecting the cities named. The principal office is Joliet. The incorporators are: Frederick E. Fisher, Louis H. Mottinger, Frederick E. Stoddard, Eneshia Meers and William H. Hounall, of Joliet.

Lakeside, Napoleon & Western (Electric).—Building is reported in progress on this line from Napoleon, Ohio, east about 50 miles through Bowling Green and Fremont to Lake Clinton and Lakeside. G. W. Brown, of Fort Wayne, Ind., and D. F. Muir, of Valparaiso, Ind., are among those interested. (April 5, p. 246.)

Lebanon, O'Fallon & East St. Louis Electric.—Building is to be begun soon, according to report, on this line between Edgemont Park and Lebanon, Ill., 14 miles. Connection will be made with East St. Louis over the Day Road.

Louisville & Nashville.—Thomas Worthington & Co., of Birmingham, Ala., have the contract for the 23 miles from Geneva to Graceville, Fla., on the extension toward Marianna, Fla., 45 miles. It is understood that building will be begun at once. (May 17, p. 342.)

Missouri, Kansas & Texas.—Contractors are making arrangements for bidding on the Missouri, Kansas & Northwestern line from Mineral City, Kan., east via Columbus and Galena, Kan., to Joplin, Mo. J. C. Stewart, of Webb City, is President of the Northwestern Line. (Construction Supplement, March 8, 1901.)

Mexican Roads.—Building is in progress on the Cananea Consolidated Company's line from Naco, on the Arizona boundary, to run south 40 miles to La Cananea, at the company's mines in the State of Sonora. A. L. Farnsworth & Co. have the contract for the first 15 miles from Naco, of which five miles is graded. (Construction Supplement, March 8, 1901.)

New System Traction (Electric).—Surveys are to be begun soon, according to report, for this proposed line from Winterset, Iowa, to Preston. It is proposed to build this summer. Lyman Waterman, of Winterset, is President.

New York & Port Chester (Electric).—This company has been incorporated in New York, with a capital stock of $250,000, to build a line from the northern end of Willis avenue bridge, New York City, to run northeast 25 miles, to Port Chester, with a branch from the junction of West Chester avenue and the Bronx, following the Bronx River to East River and thence to Clason Point. C. O. Mailloux, 76 William street, New York City, is principal owner.

North Carolina Roads.—B. Z. Henderson and other citizens of Dalton Ga., are agitating for a road from Asheville, N. C., via Dalton to Birmingham.

Northern Pacific.—Building is reported begun on a connecting line from the Portage branch to Gladstone, Man.

Oklahoma Central & Southeastern.—Surveys are being made for this line from Kiowa, Kan., southeast about 200 miles through Enid, Guthrie and Shawnee, Oklahoma City, Okla. T., to Coalgate, Ind. T., on the Missouri, Kansas & Texas. Subsidies, right of way, town sites, etc., are being secured. The company expects to let contracts about July 15. The officers are given under Elections and Appointments. (May 3, p. 324.)

Ontario Roads.—W. B. Russell, C. E., of Pembroke, has been appointed by the Ontario Government to survey the Government line into the Lake Temiscamingue district, and will take out a surveying party of 18 this coming week. The survey will include all the country between North Bay and Mattawa.

Ontario Roads (Electric).—A company composed of Kingston (Ont.) and Boston capitalists are asking for a special act for a charter from the Ontario Government to build a radial line at Kingston and ultimately to cover the territory between Toronto, Ottawa and Cornwall via Trenton. R. H. Carson represents the Kingston interests.

Pensacola & Northwestern.—S. N. Van Praag, of Pensacola, President of this line, reports that arrangements for increasing the capitalization have been made and that building is to be begun soon. The road is projected from Pensacola, Fla., north 480 miles to Eutaw, Ala. (Construction Supplement, March 8, 1901.)

People's Traction (Electric).—This company is being incorporated in Illinois, with a capital stock of $100,000, to build a line connecting Galesburg with Abingdon. Lake W. Sanborn, Galesburg, President; Eugene B. Harding, Abingdon, Vice-President.

Pere Marquette.—Surveys are in progress and building begun on the extension from Howard City, Mich., west about 20 miles to Newaygo, and thence to Ludington.

Philadelphia & Reading.—The Board of Directors have approved of the building of a short connecting link at Glenside, Pa.

Pittsburgh, Bessemer & Lake Erie.—An officer confirms the statement that the company has let a contract for a little over nine miles of line at Greenville, Pa., to eliminate heavy grades against southbound roads. The old track will be retained for northbound freights and for all passenger trains and local freights. The Broadhead Contracting Co. has the contract for the work which is already begun, and it is expected to complete it by Dec. 31 next. (May 3, p. 308.)

Plant System.—Contracts are about to be let for the cut-off 54 miles long on the Savannah, Florida & Western, from Jesup, Ga., to Folkston. This will reduce the distance between Savannah and Jacksonville by 20 miles.

Rutland Street (Electric).—This property, at Rutland, Vt., is reported sold to a New York syndicate which proposes to extend it into surrounding towns.

St. Louis & North Arkansas.—Preliminary surveys are in progress for an extension from Harrison, Ark., east to Wiley's Cove, about 60 miles. Two lines are projected, one through Sugar Orchard and along Hampton Creek, and through Low Pass and Boston Mountains, and the other via Bellefonte, Valley Springs and St. Joseph. (Construction Supplement, March 8, 1901.)

St. Louis & San Francisco.—B. F. Yoakum, General Manager, has been making an inspection trip over the Fort Worth & Rio Grande, recently acquired, and states that contracts will be let soon for the extension from Brownwood, Texas, its southern terminus, to San Saba, about 60 miles.

He also confirms the report that the road is to be extended to San Antonio and Eagle Pass, Texas, connecting at the latter point with the Mexican International.

Santa Fe, Prescott & Phoenix.—An officer confirms the report that the company is building a cut-off about 23 miles long in Arizona, which leaves the main line at a point near Mile Post 5, south of Ash Fork. The new line will be three miles shorter and the curvature and grades materially reduced. On the present line there are 43 wooden pile and trestle bridges. There will be but nine small ones on the cut-off, with a steel viaduct across Hell Canyon. The track laying force has reached the south side of the canyon and will be utilized in connection with improvement work south of Prescott, heavy rail being on the ground for relaying 10 miles of line at that point. Grading north of the canyon is progressing satisfactorily under J. W. Thurber, contractor, and the company expects to be operating the cut-off in the early fall. It is probable that further construction work will be authorized in the near future to supply needed facilities to promising mining districts but plans are not yet matured. (May 10, p. 324.)

Seattle-Tacoma Interurban (Electric).—Surveys have been made for the entire route and building is in progress on this line from Seattle, Wash., south 36 miles through Kent and Auburn and through the Puyallup Indian Reservation to Tacoma. Some of the contracts for bridge work have been let. The maximum grade is 2 per cent., and there are but few curves. There will be about 30,600 ft. of trestle, nearly all of wood. One tunnel 180 ft. long will be required. Bids will be asked for equipment as soon as definitely decided. The company has made a mortgage to the Old Colony Trust Co., as trustee, to secure $2,000,000 bonds noted last week. The officers are given under Elections and Appointments. (May 24, p. 358.)

Sherman & Northern.—This company has been incorporated in Texas, with a capital stock of $100,000, to build a railroad from Sherman north about 30 miles to a point on Red River near Cedar Mills. The incorporators are: Cecil A. Lyon, C. E. Craycroft, W. C. Eubanks, N. B. Birge, C. C. Rountree, J. P. Withers, F. Z. Edwards, John Grant, Tom Randolph and J. H. Strother, all of Sherman, Texas.

Smelter & Quarry.—This company has been incorporated in Texas, with a capital stock of $200,000, to build a railroad. The incorporators are: J. W. Eubank, George W. Huffman and Leigh Clark, all of El Paso.

Soo-Detour.—This company, with a capital stock of $500,000, has filed articles of association with the Michigan Secretary of State to build a railroad from Sault Ste. Marie to Detour, about 53 miles. The directors are: H. M. Oren, W. L. Murdock, Wm. Chandler, of Sault Ste. Marie; J. F. Goetz and J. T. Bennet, of Detour; W. M. Bullivan, of West Newton, Mass.; A. Goetz, of Gatesville; E. W. Cottrell, of Detroit; and F. H. Taylor, of Pickford, Mich.

South Carolina Roads.—The Manetta Mills Cotton Co., according to report, will build from Lando to Edgmoor, on the Seaboard Air Line. H. B. Heath, of Lando, is Treasurer.

Southeastern of Yucatan.—Arrangements are reported completed for building this line from Peto, on the Peninsula of Yucatan, Mexico, via Saban and St. Marie to Bahia de La Ascencion, 90 miles, with branches. Muller, Schall & Co., of New York, are interested. (Construction Supplement, March 8, 1901.)

Southern of New Mexico.—This company has been incorporated in New Mexico, with a capital stock of $2,000,000, to build the New Mexico section of the Southwestern of Arizona extension east to El Paso, Texas, in all about 220 miles, of which 180 miles is in New Mexico. The headquarters for the Territory will be at Deming. (May 17, p. 342.)

Southern Pacific.—Surveys are reported in progress for an extension of the Austin & Northwestern from Burnet to Lampasas, Texas, about 50 miles.

Steubenville Traction (Electric).—Thomas J. Stringer, of Portland Station, Ohio, is reported to have the contract for building this company's extension north to Toronto.

Toledo & Ohio Central.—Grading is reported begun on an extension from St. Marys, Ohio, west toward Celina, 10 miles.

Troy, Rensselaer & Pittsfield (Electric).—Application has been made to the New York State Railroad Commission for right of way for this proposed line from Albany, through Troy to Pittsfield, Mass., 35 miles. W. H. Draper, Troy, is President, and W. D. Barnes, of Brainard, N. Y., Vice-President. Ex-Gov. Frank S. Black, 149 Broadway, is the New York representative. (May 17, p. 342.)

Union Springs & Northern.—Building is begun on this line from Union Springs, Ala., to connect with the Seaboard Air Line at Fort Davis, 6½ miles. B. H. Hardaway, of Columbus, Ga., has the contract. W. M. Blount, of Union Springs, is President and General Manager. (April 12, p. 260.)

Utica & Mohawk (Electric).—This company has filed with the New York Secretary of State a certificate for an extension of this line from Utica to Frankfort, to run over private right of way.

Von Echa Electric.—Application has been made by this company to the City Council of Brantford, Ont., for the proposed line from that city to Galt.

Western Indiana (Electric).—Preliminary surveys have been made for this line connecting Indianapolis with Danville and Crawfordsville, Ind.

Wichita Valley.—A proposition has been made to Knox County, Texas, for an extension from Seymour to Benjamin, 35 miles.

RAILROAD NEWS.

Chicago, Burlington & Quincy.—Holders of the $2,291,000 5 per cent. bonds, due Oct. 1 next, are notified that until further notice the company will pay these bonds and coupons upon presentation at the company's office, Boston, Mass., at their par value, less interest, at the rate of 3½ per cent. from the date of presentation to Oct. 1.

Cincinnati, Jackson & Mackinaw.—Justice Maddox, in the Supreme Court of Brooklyn, has denied the application of Burt Reiss for an injunction restraining the Guaranty Trust Co. and others from disposing of or interfering with 3,397 shares of the capital stock of the railroad which were held by the Olcott reorganization committee and sold for it at auction last February. (March 8, p. 178.)

Detroit & Lima Northern.—This property was sold at foreclosure, on May 23, to F. J. Lisman & Co., New York, for $1,700,500, and it is to be consolidated with the Ohio Southern. (April 12, p. 260.) The Detroit Southern was incorporated May 25, with a capital stock of $17,000,000, to take over the above property.

Detroit Southern.—See Detroit & Lima Northern.

Eel River.—This property is to be sold at public auction on June 10, and the upset price is fixed at $1,000,000. (April 26, p. 292.)

Grand Trunk Western.—Coates, Son & Co., and Glyn, Mills, Currie & Co., have been receiving subscriptions in London for $4,850,000 of the first mortgage 4 per cent. bonds, due July 1, 1950, at £102 per $500 bond. (Nov. 30, 1900, p. 802.)

Hocking Valley.—The company, on May 21, declared the first dividend on the common stock since the reorganization, being 1½ per cent., payable July 20 to stockholders of record June 29.

Louisville & Nashville.—The $3,500,000 Memphis & Ohio 7 per cents., due June 1, will be paid in cash on and after that date by Vermilye & Co., New York, or Baring Bros. & Co., Ltd., London. Vermilye & Co. have bought unified mortgage 4 per cent. gold bonds issued to redeem these 7s and will exchange them at current market rates for the old bonds.

Missouri, Kansas & Texas.—The company has authorized a $6,000,000 mortgage to the Farmers' Loan & Trust Co., as trustee, to secure its St. Louis Division first refunding 4 per cent. bonds, dated April 1, 1901, and maturing in 100 years. The proceeds will be used to refund the Missouri, Kansas & Eastern 5 per cent. issues for $4,500,000, and for improvements on the line.

Newfoundland.—An arrangement has been effected between Premier Bond, of Newfoundland, and Robert G. Reid, owner of the Newfoundland R. R., to arrange the dispute between Mr. Reid and the Government. Mr. Reid wishes to turn the property over to a stock company. (Aug. 24, 1900, p. 574.)

Northern Pacific.—An injunction has been served on the officers of this company to restrain them from the sale, lease or transfer of the Manitoba section to the Government of Manitoba. (May 24, p. 358.)

Philadelphia & Reading.—The directors of the Atlantic City, the Camden County, the Seacoast and the Ocean City companies at Camden, N. J., May 24, adopted an agreement to consolidate these companies into the Atlantic City, and the agreement is to be submitted to the stockholders of the various companies at the meeting to be held on June 12 and 13. All of these companies are controlled by the P. & R. (P. & R., March 22, p. 210; Seacoast, March 8, p. 178.)

Quebec Central.—The income bondholders will vote, June 5, on a proposition to exchange each existing £100 income bond for £50 3 per cent. second debenture stock, and the £50 new income bond is entitled to receive interest not to exceed 7 per cent. per annum, payable annually. The second debenture stock will have priority over the new income bonds, both as to principal and interest, as both stock and bonds will be redeemable at par on six months' notice at any time after Jan. 1, 1922. (June 22, 1900, p. 434.)

Savannah, Florida & Western.—The shareholders, on June 20, will vote to increase the capital stock from $9,432,900 to $12,500,000, and to issue $12,500,000 of preferred stock without voting power, preparatory to absorbing the Charleston & Savannah, the Brunswick & Western, the Alabama Midland, the Ocalla & Gulf and the Tampa & Thonotosassa, all subordinate companies.

Seaboard Air Line.—Shareholders of the Raleigh & Gaston, the Raleigh & Augusta, the Carolina Central, the Chesterfield & Kershaw and the Southbound have voted to accept the consolidation agreement with the S. A. L. The other companies will hold meetings this week. The time for the meeting of the S. A. L. is yet to be fixed, at which time the final merger will be made. (May 10, p. 324.)

Wisconsin Central.—The New York Stock Exchange has listed $112,500 additional preferred, and $337,500 additional common stock voting certificates which have been delivered as part of the consideration for the property of the Marshfield & Southeastern recently taken over. The balance of the purchase price consists of $450,000 4 per cent. purchase money first mortgage Marshfield & Southeastern division bonds of the W. C., dated May 1, 1901, payable May 1, 1951, and secured by a mortgage of the same to the U. S. Trust Co., New York, as trustee. This property, together with the equipment, lands, etc., was acquired free from lien and is owned in fee, subject only to the above bonds. The property was taken over May 1, and now forms part of the Second District of the Southern Division and will be known as the Neekoosa Branch. (M. & S. E., May 17, p. 342.)